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THEORY AND

PRACTICE OF MEDICINE

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MEDICAL DEPARTMENT,
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A HANDBOOK
ON
THE THEORY AND PRACTICE
OF
MEDICINE

MEDICAL DEPARTMENT

WILKINS COLLEGE

VICTORIA UNIVERSITY

THE THEORY AND PRACTICE OF MEDICINE

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P R E F A C E

IN the following pages I have attempted to describe the chief facts which underlie a knowledge of the principles and practice of medicine.

No one can be more convinced of the fact than I am myself of the impossibility of acquiring a competent knowledge of the subject from the pages of any text-book whatever, unless at the same time practical work is carried out in the wards, in the out-patient room, and in the dead-house.

It seems to me that in a book dealing with the principles of the subject all matters which are superfluous should be omitted, and amongst such matters are long disquisitions on morbid anatomy which it is impossible for the student to understand unless he has large post-mortem experience. I have therefore avoided tiresome, lengthy paragraphs on the subject of morbid anatomy, confining my descriptions to those facts which are absolutely essential, and leaving the rest to be acquired by frequent attendance in the post-mortem room.

For the same reason but little has been said concerning the very numerous theories on the pathology of individual diseases. These theories are mostly conspicuous only for their inadequacy, and are, moreover, constantly changing; they are, therefore, far more likely to hinder than to forward the progress of the student in his practical work.

I must say a word on the somewhat brief attention which has been devoted to drug treatment.

It has always seemed to me that the proper details of therapeutics should be sought in books devoted to that subject. And further, this knowledge should be acquired after the student has made some progress in the method of diagnosis of disease, and in the acquirement of what may be best described as its natural history. Then, and then alone, will he be in a position to form an opinion as to the action of drugs, and to reduce to something like order the chaos of facts which are necessarily included in the subject of medical treatment. Further remarks on this important matter I have relegated to a special section at the end of the second volume.

No one nowadays can write a book on any subject without having to refer to the works of predecessors and contemporaries; and this is particularly the case as regards a book on the principles and practice of medicine, a subject almost worn threadbare.

In writing these volumes I have largely made use of my case notes and have relied upon these sources of clinical

Preface

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and pathological experience. Amongst the works of others which I have had occasion to consult, I may perhaps mention the late Dr. J. S. Bristowe's "Principles and Practice of Medicine," that excellent work "Twentieth Century Practice of Medicine," Dr. Osler's "Principles and Practice of Medicine," and Dr. P. Manson's "Tropical Diseases." As regards the latter especially, a subject of which very few of us are possessed of more than a limited knowledge, I have followed the teaching contained in these works. It is meet also that I should mention in this connection the late Sir M. Mackenzie's classical work on diseases of the throat, and should refer to many articles of great value contained in French, German, and Italian magazines and other publications too numerous to be specially mentioned.

I cannot conclude without expressing my most sincere thanks to Dr. C. S. Humphreys for the invaluable help he has given me in the preparation of this work. I alone can fully appreciate the debt of gratitude I am under to him, for he has criticised the manuscript throughout, has given most valuable advice, and has read through the proof-sheets, all with the greatest patience and kindness.

To Mr. A. J. Hughes, C.I.E., I am indebted for much valuable information on tropical diseases, more especially as regards plague and cholera. My best thanks are also due to Dr. L. Freyberger, Pathologist to the Great Northern Central Hospital, who has given me much valuable assistance and counsel; and to Dr. Carpenter, Physician to the

Evelina Hospital for Sick Children, to whom I am indebted for many admirable hints concerning the diseases of children.

The second volume is in the press, and will be published at an early date.

H. W. SYERS.

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THE THEORY AND PRACTICE OF MEDICINE

INFLAMMATION

INFLAMMATION may be defined as the reaction of living tissues to irritation or to injury. The irritation may be of various degrees of intensity, and of very diverse nature. It may be mechanical or chemical, the former being due to a wound or other injury, and the latter to such an irritant as nitric acid or caustics in general. In medical practice, however, inflammation is generally caused by more obscure agencies, although it is still met with in the form just alluded to. For instance, the persistent ingestion of large quantities of alcohol may cause inflammation of the stomach and liver, and many cutaneous diseases are due to the presence of parasites which act mechanically in setting up irritation of the skin. Inflammation in medical practice is frequently due to the action of microbes, as for instance in the specific fevers, the eruptions of which are in all probability the result of the activity of micro-organisms. It is very possible, also, that the diphtheritic membrane is due to the agency of certain definite micro-organisms. That cold and wet acting on the human body will cause inflammation is also certain ; whether, however, it is to the activity of micro-organisms that the inflammation is due is an open question. It is quite possible that the diminished resistance which a subject exposed to cold and wet presents to the ravages of bacteria may be really the true

explanation, and in this case exposure would be a predisposing cause only. Inflammation common to medicine and surgery may be set up by the action of certain micro-organisms, the *streptococcus pyogenes* and *aureus*, the *staphylococcus*, the *bacterium coli*, the *gonococcus*, and many others.

The phenomena which are characteristic of inflammation consist in the four classical signs, heat, pain, swelling, and redness, to which may be added loss or alteration of function of the inflamed part. Histologically, at the earliest stage of the inflammatory process, after brief acceleration, there is diminished movement in the circulating fluids, with a tendency of the white blood corpuscles especially to arrange themselves in masses, and at the outside border of the blood current. Next, extravasation of red and white corpuscles takes place; these corpuscles obtain access to the surrounding tissues, and, if the irritation be sufficiently intense, form pus corpuscles. There is proliferation of the cells contained in the surrounding tissues, the cellular elements of the same showing increase of function, especially the connective tissue cells; a considerable number of new elements appear, somewhat resembling leucocytes, but larger, and having prominent nuclei. Much difference of opinion exists as to the exact rôle played respectively by the leucocytes and the fixed cells of the tissue in the inflammatory process. At the same time that these changes are taking place the serous component of the blood is also extravasated, and produces the characteristic inflammatory swelling. The nature of the exuded matter varies greatly. It may be fluid, or may consist of a coherent lymph containing large quantities of fibrin, or it may be purulent. If a mucous surface be the seat of inflammation, an increased quantity of the characteristic secretion will be formed.

The result of inflammation also presents wide variation; if the cause be only slight and transitory, in no long time the corpuscles and serous effusion are absorbed, normal

circulation is re-established, and all goes on as before, the part having sustained no permanent damage. On the other hand, the noxious influence may have been so violent as to excite an inflammation of such intensity as to lead to the death of the part affected; in other words, necrosis results, and the inflamed organ becomes gangrenous. Under such circumstances restitution of the tissues affected is out of the question; a sequestrum forms, which is cast off by the development of a line of demarcation between the dead and living structures. Between these two extremes every variety and degree of inflammation may occur. A very common result of severe inflammation is abscess formation, in which a collection of pus is produced and evacuated internally or externally. In this process the tissues immediately affected are destroyed, but new connective tissue is formed and a cicatrix results. If the process becomes chronic, there is a tendency for new formation of fibrous tissue to take place, and this formation of new tissue is due in great degree to a proliferation of the cellular elements of the structure in which the inflammation occurs. This process is seen in chronic inflammations of internal organs, which often creep on insidiously with advancing years, and by which the different structures are compressed and displaced through new fibrous tissue, as in chronic nephritis.

Inflammation may be classified according to the nature of the process, and of the effused materials; thus, it may be *catarrhal* when affecting mucous membranes, and in this case leads to the greatly increased secretion of mucus which is seen in bronchitis, for instance. Again, it may be *fibrinous*, as in inflammation affecting serous membranes; here the exudation is that of lymph, which is deposited over the serous surface in the form of a coherent membrane made up of fibrinous threads, and enclosing leucocytes and red corpuscles in its meshes. *Diphtheritic* inflammation affects the whole depth of a mucous membrane. Whereas, in fibrinous or croupous in-

flammation the upper strata are affected, in the case of diphtheritic inflammation the whole thickness is the seat of the inflammatory process. The epithelial surface is destroyed, and a so-called false membrane results; on this being detached, a raw and bleeding surface is left, which is never the case with croupous inflammation. The false membrane in the diphtheritic process is also rapidly renewed after removal.

Inflammation is accompanied with symptoms of fever, which vary according to the intensity of the morbid process, and which in very slight cases may be almost entirely absent.

SCROFULA, OR SCROFULOUS INFLAMMATION

THE term scrofula, or scrofulous inflammation, is much less often employed at the present time than formerly. It has always, even in the days when constantly used, been a matter of some difficulty to understand exactly what was implied by the expression. Certainly scrofula was supposed to be evidenced by the presence of enlarged, and often suppurating, cervical glands, the very name apparently alluding to the increased size of the neck, causing a fancied resemblance to that of the pig (*scrofa*). In addition to a liability to glandular enlargement, other tendencies were also considered to be characteristic of a scrofulous taint of the system. It was thought that children the subject of scrofula were liable to catarrhal inflammation affecting the nose, to chronic inflammation of the cornea, to ear discharges, to chronic eruptions of the scalp and skin generally, and to enlargement of the tonsils. At the same time, the "diathesis" expressed itself in certain physical peculiarities, such as a thick skin, heavy features, scanty reddish hair, and a stunted, but well-nourished, figure. It need scarcely be said that, although there is a certain amount of fact in these generalisations, inasmuch as it is perfectly true that children of the physical appearance here described are often liable to the maladies indicated, yet the contention that such conditions are all caused by a "scrofulous diathesis" cannot for a moment be maintained. The enlargement of the glands, so marked a feature in the clinical picture of scrofula, is now known to be tubercular, and the form of inflammation showing itself by burrowing and a development of sinuses is of course nothing more or less than the tendency to caseation and breaking down so

characteristic of tubercular deposits. The term scrofula is best, therefore, entirely discarded, as its meaning is indefinite, and it does not explain anything from the clinical point of view.

It is only fair to add that some observers are still of opinion that the expression should be retained, and they go so far as to hazard the conjecture that other bacilli may exist, differing from that of tubercle, both in their appearance and in their clinical results, upon the activity of which the physical signs more or less indicative of scrofula may, they think, depend. Were these views substantiated by bacteriological and clinical evidence, which is at present very far from being the case, it is needless to say that scrofula would again take its place upon the pathological pedestal from which at present it has been thrown down.

FEVER

IN health the temperature of the body remains, with but slight and unimportant fractional variations, at 98.4° Fahr. The slight changes just mentioned are due to various causes, *e.g.*, the temperature may be the fraction of a degree higher after the partaking of a substantial meal. On the other hand, prolonged fasting may be attended with a fall of temperature of similar extent. It is tolerably clear that the average temperature of 98.4° is maintained by an adjustment, as it were, between the production of heat and its dissipation. The production of heat, of course, depends upon the oxidation of the tissues by means of the blood, and its dissipation upon the evaporating arrangements which are such an important item in the functions of the lungs, the skin, and the kidneys. The controlling centre for these different processes is located in the medulla oblongata, and any injury or disease affecting this centre may be attended with marked derangement of the body temperature. Therefore abnormal temperature, or fever, may be due either to increased heat production or to diminished heat abstraction, and both these factors are themselves directly under the influence of the nervous system.

There is much reason to think that living organisms (microbes) have an important influence upon the production of fever by obtaining access to the blood, but how they act is unknown. Possibly toxins are developed, which may have some prejudicial influence on the centre for the regulation of the body temperature. If this view is correct as regards the action of microbes in causing fever, the latter may be considered a beneficial effect of their activity, for by the increased temperature both the microbes and

toxins are destroyed or rendered inert. Undoubted causes of fever are local injuries, in which case the fever is *symptomatic*, or if the phenomena of inflammation ensue in the injured part, *inflammatory*. The direct influence of the nervous system in causing excessive temperature is occasionally seen in cerebral disease, such as tubercular meningitis, in which malady the temperature not seldom rises to a great height a few hours before death.

Many different kinds of fever are described. A fever may be *continuous* when the temperature remains high, with but slight diurnal variations; this type of pyrexia is seen in the second and third weeks of enteric fever. Again, fever may be *remittent* when considerable diurnal falls occur, but nevertheless the lowest temperature attained still remains above the normal. *Intermittent* fever is characterised by the normal being occasionally touched. Another type of pyrexia, frequently observed, is the *hectic*; this occurs in suppurative disease causing wasting, such as disease of bone, phthisis, etc., and is characterised by marked daily excursions of the temperature curve. As a rule there is an evening rise and a morning fall, the evening rise being often followed by profuse sweating. In some cases, however, there is an evening fall and a morning rise, a variety of fever resulting which is known as the *typhus inversus*. Hectic is undoubtedly a septic fever, and should properly be classified under the head of septicæmia.

Another division of fever is that according to the times and seasons at which the patient is liable to be attacked, or according to the duration of the pyrexia. Thus a patient may suffer from an attack each day, in which case the fever is *quotidian*, or every other day, when the term *tertian* is used. If every fourth day, the fever is *quartan*. These are all varieties of malarial intermittent fever.

It should be observed that in children the temperature is markedly more remittent than in adults; thus

in typhoid fever the child's temperature at the period when in grown-up people continued fever is present, shows marked remission. So characteristic of the disease in children is this form of temperature that typhoid fever in them was formerly known as *infantile remittent fever*. In children, too, the temperature is extremely unstable, and easily raised by causes in themselves trivial and of no importance. Thus in a young child a temperature of 103° , or even higher, may be induced by a slight chill, or by an unwholesome meal, with consequent indigestion. From a practical point of view it is very necessary to be aware of this fact, as otherwise too much importance may be attached to a sudden rise of temperature in a young child. In all such cases the fall of temperature is often just as rapid as the preceding rise, and a temperature of 103° over night may be followed the next morning by a perfectly normal one.

The phenomena of fever are characteristic; very often its onset is attended by feelings of chilliness, or by shivering, and in many cases a distinct rigor ushers in the attack. It must be noticed that in children the place of rigors is often taken by convulsions, which are not at all uncommon in young children at the commencement of the specific fevers. All the time the patient is shivering with cold the temperature is rising fast. The rate of the pulse in fever is markedly increased, and its quality altered, being soft, compressible, and occasionally dicrotic; the latter peculiarity is very usually observed when the tension is low and the fever continuous, as in typhoid fever. When the febrile state is fully developed, the skin is often dry and hot, even pungently so, as in pneumonia. Respiration is accelerated, the tongue is often dry and covered with whitish brown fur—it may be cracked and fissured, and the lips at the same time covered with sordes. This is frequently seen in the typhoid state, however induced. The bowels are often confined, the urine scanty, loaded with urates, and often containing a trace of albumen as

well as an increased quantity of urea. The appetite is impaired, or altogether lost. The nervous system suffers, the patient is often sleepless, suffers from severe headache, and may be delirious. There is a rapid loss of weight, and after prolonged fever great emaciation and debility may ensue. Fever may disappear gradually, by lysis, or more or less suddenly, by crisis. When the latter occurs, in the course of twenty-four or thirty-six hours, or less, the temperature falls from a considerable height to the normal, or below it. A typical crisis is observed in many cases of pneumonia, in which a few hours may see the temperature fall from 104° to normal or subnormal; such a crisis is attended with a markedly favourable change in the condition of the patient, a change which the first glance at his face reveals. Critical falls of temperature are frequently attended by profuse sweating, or by diarrhoea; in falls by lysis the reduction of temperature may occupy days; it is typically seen in the defervescence of typhoid fever. In this complaint the evening rise and morning fall persist during the decline; but, day by day, the evening rise is less and the morning fall greater, until the two points approximate. Severe fevers are often followed by a period in which the temperature remains for some time subnormal; this is especially the case with children. Prolonged fever has a debilitating effect upon the heart, perhaps due to changes in the muscular fibres caused by the high temperature, and for this reason weakness and irregularity of pulse are often observed after enteric and other fevers.

From the normal to 100.5° fever may be called *slight*, from a 100.5° to 102° *moderate*. From this point to 104° it may be described as *severe*; above 105° the temperature becomes *hyperpyretic*, a condition usually attended with serious danger to life. We say "usually" advisedly, for in general paralysis of the insane epileptiform attacks occur in which temperatures of extraordinary height may be recorded with no apparent danger. We have seen a temperature of 110° attained in this disease, and the next

day the patient was in his usual health. But, as a rule, temperatures above 106° are attended with loss of consciousness, convulsions, and coma, and are almost invariably fatal.

ŒDEMA, OR DROPSY

WHEN fluid accumulates in a cavity, such as the peritoneum, or when it occurs in excess in the tissues of an organ, dropsy is said to result. The fluid in œdema bears a close resemblance to blood serum ; it is usually clear, pale yellow in colour, of specific gravity, 1012 or thereabouts, and coagulates on heating, but it may also do so spontaneously, forming a clot. It contains serum, albumen, and chlorides in large quantities. When occurring in the peritoneal cavity, the condition is known as *ascites* ; when in the pleura, as *hydrothorax* ; and when in the pericardium, the term *hydropericardium* is used. And so on. When the whole body is œdematous, *anasarca* is said to be present ; on the other hand, when the dropsy is more or less local, it is termed *œdema*. Œdematous tissues pit on pressure, but in many cases this pressure must be kept up for some seconds before pitting ensues.

Dropsy may depend upon a variety of causes, but one of the chief is impediment to the return of the blood to the heart by the veins, or it may be due to an obstruction in the lymphatic system. Hence, if a ligature be placed round a limb, the latter swells below the point of constriction. The result of mechanical interference with the venous return is seen to its fullest extent in cases of valvular heart disease in which the compensation has broken down ; it is especially the lower limbs that are affected in this condition, and the œdema is always most marked at night, owing to the influence of gravitation during the day. Should venous return be interfered with by pressure of a tumour or aneurysm, œdema will result in the same way. The escape of serous fluid in mechanical obstruction to the return of blood is no doubt due to the

increased pressure within the small vessels and capillaries. This at last becomes so pronounced that the capillary walls no longer offer resistance to the passage of their contents, and the latter gain access to the interstices of the tissues. Œdema is a very common physical sign of renal disease, and in this condition its cause is obscure, though it probably depends upon some change in the walls of the small vessels and capillaries which is the result of the kidney lesion. Œdema also occurs frequently in anæmia, scorbutus, and other conditions in which the quality of the blood is profoundly altered. As already mentioned, dropsy due to cardiac lesion is most marked in the lower extremities and in the evening. In renal dropsy the eyelids and loose tissue of the scrotum are especially affected. The œdema of the eyelids is most marked on waking in the morning, and gets less during the day. In anæmia the œdema is often only slight, and most marked about the ankles. It must be borne in mind that the nutritive functions in dropsical limbs or regions are always gravely interfered with; vitality is lower than normal, and a slight injury may lead to serious sloughing, or even gangrene. Obviously, therefore, the subjects of dropsy are not in a favourable state for operative procedure.

The treatment of dropsy is that of the condition upon which it depends; when large serous effusions occur, it may be necessary to remove or diminish them by tapping or paracentesis.

DEGENERATION

By the term degeneration is implied a change in a tissue through which its constitution is altered in such a manner as to make it a less efficient agent in the discharge of its functions. A more elaborated tissue is replaced by a simpler one. A common example of this process is fatty degeneration of the heart. In this lesion the muscular fibres of the organ become replaced by fat globules, it may be to such an extent that every trace of muscular tissue disappears, and the sarcolemma becomes filled with minute, glistening particles of fat. In a precisely similar manner the essential structure of the liver and of other organs may be altered and become fatty, as may also the walls of the arteries by atheroma, which is a degeneration of the arterial walls affecting the deeper layer of the internal coat. Another kind of degeneration is the *amyloid*, which affects the spleen, liver, kidney, etc. Calcareous degeneration is usually merely a later stage of other varieties of the same process, especially of that known as *caseous*, and is due to the deposit in the degenerated tissue of the lime salts of the blood. In all these cases infiltration must be carefully distinguished from degeneration; in the former, some addition is made to tissues in themselves healthy, whereas in the latter the change is always at the expense of the tissue itself. Fatty infiltration of the heart is of not uncommon occurrence in middle-aged people of full habit. In this condition fatty tissue is developed in the connective structures overlying the organ, and in the interstices of the muscular fibres. It must be borne in mind that the two processes of infiltration and of degeneration may proceed simultaneously. *Colloid* degeneration is met with occasion-

ally in cancerous growths and in morbid conditions affecting the thyroid gland; in this condition the epithelial elements of the tumours melt down, as it were, into a homogeneous soft, yellowish mass, wherein all trace of structure is lost. In colloid degeneration of malignant growths the fibrous stroma may be affected as well as the cells. *Mucoid* degeneration is seen in myxœdema. In this disease the connective tissue of the skin and of other organs undergoes a characteristic change into a substance resembling mucin, whereby the tissues affected becomes soft, elastic, and altered in appearance. Similar degenerations may affect the mucous membranes in this and other diseases; mucous degeneration may also occur in new growths, malignant and other. Less indefinite than some of those already described is the degeneration known as *hyaline*. In this case the structure of the affected organ presents a pale, uniform appearance, owing to the production of a new proteid substance which possesses these naked eye characters. Hyaline degeneration may affect new growths, and it may also be observed in the arteries, in the muscles, or in internal organs.

NEW GROWTHS

New growths may be innocent or malignant. The former consist in an increase of a normal tissue, a tissue which is a component of the body; when removed they show no tendency to recur, they do not tend to implicate the neighbouring lymphatic glands, and the general health is in no wise impaired, at least so far as the immediate growth of the tumour is concerned. An innocent growth may interfere with the general health as a result of its size, or from its pressure on other structures. The innocent tumours are the fibromata, the lipomata, etc.

Malignant tumours are heterologous, *i.e.*, they differ to some extent in their structure from that of the part in which they occur. They do to a certain degree correspond with normal tissues found in the body; but as regards the structures in which they occur, they are a new formation, a growth different from and unallied to the normal tissues. Malignant growths are characterised by a great tendency to recurrence after removal, and by a very strong liability to infect the lymphatics and the neighbouring lymphatic glands, as well as by an equally strong tendency to metastasis, and by a very detrimental effect on the general health, which invariably suffers from their presence.

The origin of malignant tumours is veiled in obscurity; it cannot be said that we have any definite knowledge on the subject. Many theories have been propounded to account for the facts, but they are all more or less unsatisfactory. Of late years, and doubtless in connection with the great attention which has been devoted to bacteriological research, there has been a

tendency to regard malignant growths as of parasitic origin, and certain so-called "organisms" have actually been pointed out as the cause of the disease. These "organisms" have been described as belonging to the protozoa, and as resembling the *coccidia* so often found in the liver and internal organs of rodents, which also belong to the same class, and are said to be situated in the cells of the malignant tumour. It is scarcely necessary to say that the claims of these "protozoa" to be regarded in any way as the cause of sarcoma or of carcinoma are very far from being vindicated. In all probability they are nothing more than degenerate changes in the affected cells, and are in no sense organisms, parasitic or otherwise. In some exceptional cases new growths have been inoculated upon healthy animals, and the results thus obtained have been claimed as supporting the parasitic theory of the malady. Successful inoculations, however, are equally reasonably explained by the passage of cellular elements of the growth into the blood and lymph streams of the animal operated upon, and the aforesaid claims must therefore fall to the ground.

The malignant new growths include the *sarcomata*; these tumours occur in connection with the fibrous structures of the skin and internal organs, but never originate from epithelium. Their whole structure resembles that of embryonic tissue; they consist of small cells, which may be round or spindle-shaped, or of larger ones, which may also be spindle-shaped or myeloid. The cells are nucleated, and in the myeloid forms the nuclei are often very large and prominent. There is in all cases a certain amount of intercellular tissue, which may, however, be present in an extremely attenuated form. It is often more or less fibrous, but may be so soft and delicate as easily to escape detection. Sarcomata are always extremely vascular, which accounts for their power of rapid extension through the affected organ. In some cases pulsation occurs, as a consequence of the rich vascular supply of the tumour. Sarcomata are divided into several varieties, of which one of the most

malignant is the *melanotic*. The malignancy of melanotic sarcoma is extreme; it often originates in the connective tissue of the skin, and microscopically it is found that its cells contain much pigment to which the dark colour of the growth is due. Such tumours not infrequently take their origin in a congenital pigment spot, such as a mole. Other varieties are described as large spindle-celled and small spindle-celled sarcoma; they are always very malignant, the round-celled growths being perhaps less so than the other variety. A form of large round-celled sarcoma is known as "alveolar," and bears a strong resemblance to a carcinoma, but close examination will always reveal the presence of a fine fibrillated tissue lying between the large, flat, epithelial-looking cells. Finally, in connection with cartilage and bone, *myeloid* sarcomata occur. In these are found the large nucleated cells already mentioned; they arise from the bones or from the periosteum, as from that of the femur. These growths are also extremely malignant.

Many theories have been put forward to explain the origin of sarcomatous growths. That of Cohnheim is the only one that requires mention: he considers that in the embryo a certain quantity of undeveloped tissue is left over from the blastoderm, and that this overplus may, under certain conditions, take on active growth and multiply. Sarcomata are relatively more frequent in youth, but may occur at any age. Almost any organ may be the seat of the disease, and they are excessively malignant.

Allied to the sarcomata, but presenting a somewhat less degree of malignancy, are those morbid conditions affecting the lymphatic glands which are included under the term *lymphadenoma*. This form of growth is observed in Hodgkin's disease and in leucocythemia. In these affections the lymphatic glands become the seat of a new growth, which greatly increases their size, and which by the fusion of the glands tends to form large

and very conspicuous masses in various parts of the body, such as the neck, the arm-pit, and the groin. Histologically the growth consists of nucleated lymph corpuscles contained in a fine reticulation of fibrous tissue; in fact, the structure is similar to that of a lymphatic gland. In most cases the new growth does not transgress the limits imposed by the gland capsule, but rarely it may be more or less generalised in the different organs of the body. It will thus be seen that lymphadenoma is a growth presenting, usually, but slight evidence of malignancy; but in exceptional cases it may approximate to that very malignant form of tumour known as "lympho-sarcoma." This, which is a variety of round-celled sarcoma, is of not uncommon occurrence. It gives rise to soft, yellowish-white, rapidly-growing tumours, presenting in a high degree the property of diffusion in most organs of the body, and all the other attributes of extreme malignancy. The histological structure of this growth bears a marked resemblance to that already described as occurring in lymphadenoma; namely, large round nucleated cells contained within the meshes of a delicate fibrous stroma.

It is uncertain whether *cancer* should be regarded as a local affection causing wasting and ill-health from its tendency to increase and ulcerate, or whether the condition is a general and constitutional one, of which the growth is but the local expression. However this may be, the fact remains that sooner or later the presence of a cancerous tumour is associated with profound, and ultimately fatal, disturbance of health. There can be no question that the tendency to this disease is hereditary, and that it is liable to appear at or about the same age in successive generations. Cancer occurs at all ages and in both sexes, but is far more common in middle and advanced life, and also in women than in men. If the predisposition to the disease exists, it appears to be possible that it may be lighted up by a blow or other injury, or by prolonged irritation. The disease is one

affecting the epithelial structures ; it consists in an over-production of epithelial cells, which are no longer limited to their normal locality, but tend to invade neighbouring structures. At the same time, leucocytes and lymphoid cells develop, and form a connective tissue network, in the meshes of which the epithelial cells are found. The latter differ in size and shape from those of the tissue in which the growth originates. They are unduly large, and are very strongly nucleated. The stroma is vascular, and is probably due, in part, to the irritation of the adjacent connective tissue by the invasion of the epithelial cells. There is no fibrillated structure lying between the individual cells, a point of importance in the differentiation of sarcoma and carcinoma. There is a marked tendency to implication of neighbouring lymphatic glands, which become enlarged, tender, and eventually involved in the cancerous process. At a later stage the new growth, having choked by pressure the blood-vessels which supply it, tends to break down, with resulting ulceration. This ulceration is intractable to any treatment short of extirpation by the knife. It steadily progresses, ultimately involves all neighbouring tissues, and further tends to infect different organs, especially the viscera of the thorax and abdomen, the result of which is that these also become the seat of cancerous masses, the so-called secondary growths. Hæmorrhage may also arise, in consequence of ulcerative perforation of vessels, and may be so severe as to cause death. Cancer, if removed, tends to recur. This is doubtless due to the impossibility of entirely getting rid of the new growth. Some, though but a very few, cells may be left behind ; these act as a focus, proliferation occurs, and the lesion reappears. Lymphatic vessels are abundant in cancerous growths, and this explains the frequency with which the lymphatic glands are involved through the cancerous cells gaining access to them, and thus infecting the nearest glands.

The different varieties of cancer are merely artificial

groups constituted by the varying proportion in which cells and fibrous tissue are present; when the latter is abundant in proportion to the former the growth is hard, and is known as *scirrhus*. When, on the other hand, the proportion is reversed, a soft brain-like growth is the result, to which the term *encephaloid* has been applied. It occurs frequently in internal organs as a secondary deposit. Sometimes a sort of degeneration ensues in cancerous growths; the mass softens and becomes sticky like glue, and this is known as *colloid* transformation of cancer. Cancer occurring in connection with the skin is often more or less a local disease; the cells are large and flat, and there is but slight tendency to glandular implication. This form of the disease is known as *epithelioma*, and is the least malignant variety of cancer.

MICRO-ORGANISMS AND DISEASE

At the present day there is a strong tendency to believe that all infectious diseases, and a considerable number of non-infectious maladies, are due to the agency of micro-organisms. Since the days when the anthrax bacillus and wool sorters' disease were connected as cause and effect, the trend of medical opinion has been steadily in this direction. At the present time not only are tuberculosis, septicæmia, pyæmia, and the exanthems regarded as of microbic origin, but many are disposed to look upon acute rheumatism and rheumatoid arthritis as due to the same cause. It has even been suggested that cancer is due to a microbe. Undoubtedly there is danger of a reaction when matters are pushed as far as this. That there is evidence to show that micro-organisms have a very strong influence upon the generation of many maladies is perfectly true, yet it is absurd to drag this view into the question of the causation of every possible disease, as is too much the tendency at the present time. The most convincing case of all is that of anthrax, and the degree of probability becomes less and less in regard to other diseases being due to the effects of an organism in direct proportion to their afebrile and chronic character. There is a tendency to associate with the organism the supposed result of its physiological activity, the so-called "toxin," and it is considered by many that, instead of acting directly, many micro-organisms do so only through their "toxins," of which the variety is infinite. This question has an important bearing upon treatment, and efforts are being more and more directed to the discovery of *antitoxins*, by which is understood certain products contained in the blood of an animal which has

itself been rendered immune to the disease which it is desired to destroy by the antitoxins. This immunity is gained by successively injecting the animal with diluted preparation of the toxic principle, so that it is no longer susceptible of being infected by the virus of the disease in question.

As proofs of the germ theory of many diseases are adduced the following:—(1) The smallest quantity of virus produces indefinite quantities of the same when injected into the blood of a susceptible animal. (2) Certain micro-organisms produce certain diseases, and those only. (3) The presence of a latent period before the outbreak of symptoms. (4) The definite course of events which follows the introduction of the virus.

Micro-organisms are known as *bacteria*; they are of three kinds, *micrococci* when round, *bacilli* when resembling small rods, and *spirilla* when twisted. Many of them are capable of being cultivated on different nutrient media, and it is from these cultivations that inoculations on different animals have been made. There is no doubt that the claims of bacteriology have been pushed too far, and the student is earnestly warned against accepting the confidently expressed views of the professional bacteriologist, whether British or foreign. The whole subject is still *sub judice*, and likely to remain so for a long time. And it cannot be too strongly impressed upon the student that to assume, as is too often done, that all and every disease is really due to a micro-organism is absurd, and when pushed to its logical conclusion is certain to end in disaster and confusion.

DIVISION I
INFECTIOUS DISEASES

MEASLES—MORBILLI

THE incubative period of measles is generally about a fortnight. In individual cases it may vary from a week to seventeen or eighteen days. There are no symptoms during this period.

The first symptoms of measles are those of catarrh. Symptoms.
The patient complains of cough and is possibly hoarse, there is sneezing and running from the nose, and the conjunctivæ are red and injected. This condition persists and becomes more marked, when, usually on the fourth day from the commencement of symptoms, the rash appears. Its site at first is generally the forehead, the cheeks, the neck, and the back, but it very quickly spreads over the entire face, and thence covers the whole body. The rash is especially well marked on the back; its colour is dusky, a purple red, and the tendency is for it to be arranged in patches, which unite, but not completely. The result is that the eruption is variegated with healthy patches of skin between the several islets. The rash is essentially papular, and by the finger can be felt to be slightly raised. It may be observed on the mucous membrane of the mouth, pharynx, and tonsils. With the appearance of the rash the temperature, previously normal, begins to rise; it may quickly attain the height of 102° or 103° , and continues febrile so long as the rash is incompletely developed. When, however, the eruption is fully mature the temperature falls, contrary to what happens in scarlet fever. During all this time the symptoms of catarrh persist and cause the patient much inconvenience, but with the full development of the rash in favourable cases these symptoms ameliorate, and in a few days dis-

appear altogether so far as the coryza and sneezing are concerned. But bronchial catarrh may persist for some time, and in children may become the cause of considerable anxiety. The usual symptoms accompany the febrile condition, and in addition there may be, and often is, a tendency to diarrhœa. This may become an urgent, even dangerous feature. Very soon after the fall of temperature and full development of the rash the latter begins to fade. The colour changes; it is no longer of a deep purple, but rapidly assumes a yellowish red tint, somewhat resembling in this respect the change observed in a bruise. Finally, in a few days nothing is left but pigmentation, which may persist for some time. Accompanying the fading of the rash is desquamation; this is in fine and branny scales, quite unlike the coarse desquamation of scarlet fever.

Such is the course of ordinary uncomplicated measles. The order of events is, however, by no means always so benign. There is in measles from the very outset a great tendency to inflammation of the mucous membranes, especially those of the bronchial tubes, and this inflammation very easily extends to the air vesicles, the patient then becoming the victim of broncho-pneumonia. This is one of the commonest, and at the same time one of the most serious, complications of the disease. It should always be suspected if, at the period of full development of the rash, the temperature remains up. The actual physical signs and symptoms of the condition are, of course, to be determined in the usual manner. Untoward symptoms sometimes occur in regard to the eye; the coryza may be intense, and the inflammation may involve the cornea, perforation of which possibly ensues. The throat symptoms in measles are not usually severe; nevertheless, such severe faucial affection may occur that this may be a very grave complication of the malady. Ear complications are not confined to scarlet fever; inflammation of the middle ear may occur in measles, and any pain in the organ should at once lead to the suspicion that inflammation has

involved the Eustachian tube of the corresponding side. Formerly it was thought that measles developed a tendency to the gangrenous destruction of certain portions of the skin and of the underlying tissues. Cases of *noma* or gangrenous stomatitis were described which were considered to be due to measles. Such conditions are not seen nowadays in connection with the disease, and probably at all times the relationship supposed to exist between them has been more apparent than real. Reference has already been made to the tendency to diarrhœa; in certain cases this may become a most serious symptom, and one threatening the life of the patient. It is to be particularly noted that in children, who are the chief subjects of measles, apart altogether from any complication, even the mildest attacks are liable to be followed by impaired health. Very often indeed measles is the starting-point of enlargement of glands; those of the neck, chest, or abdomen may be affected. It is very frequently the case that measles is the determining factor in developing tuberculosis, and nothing is more common, especially in hospital practice, than to find tuberculosis in children preceded at some months' interval by an attack of measles. Indeed, there can be no doubt that measles and pertussis are, between them, the most common exciting causes of the disease. Apart from such serious affections, the child's health is often for a long period impaired by the complaint, and it is not possible to too strongly deprecate the prevailing idea that measles is a trivial disorder, not even necessitating confinement to bed. Such a delusion accounts for the loss of numbers of lives annually.

Measles is a virulently infectious and contagious disorder. It is especially so amongst children, and when a case has once broken out it will spread with great rapidity through a household or a school. As a rule, it is only suffered from once in a lifetime, but to this rule there are numerous exceptions, and it is no uncommon thing to meet with cases in adults who have nevertheless had the disease

in childhood, and it may even be contracted a third time.

There are instances, happily rare, in which the disease assumes a malignant aspect. From the first the patient is prostrate, with feeble pulse, sighing respiration, and a rash appears which may be the seat of hæmorrhagic effusion ; it is needless to say that such cases are extremely dangerous, and in most cases fatal.

Causation
and Morbid
Anatomy.

Although there is strong reason to believe that measles is due to a micro-organism, yet, as in the case of scarlatina and other infectious fevers, the attempts to isolate this organism have invariably failed. We are as much in ignorance of the real nature of the virus of measles as of that of scarlatina. The chief effects of measles are displayed on the skin and mucous membranes, especially those of the air passages, and the pathological appearances of the malady are those of its complications, especially bronchitis and lobular pneumonia.

Treatment.

In the treatment of measles it is especially important to avoid fresh catarrh or chills. For this purpose the patient should be put to bed directly the catarrhal symptoms appear, and be kept there during the whole course of the malady. The room should be maintained at a temperature of about 64° or 65°, and be carefully ventilated. In treating the bronchial catarrh it is very desirable to administer as few drugs as possible, and especially is it prudent to avoid the so-called expectorants at an early stage, and while the cough is still hard and dry. If given under these circumstances they are productive of nothing but harm. Citrate of potash with ipecacuanha wine and a little syrup of tolu is usually all that is required. In more serious cases, when lobular pneumonia develops, stimulants will be necessary, and the treatment must be conducted on the lines laid down for that affection. Care should be observed in administering aperients to children the subject of measles. The tendency to looseness of bowels in this disease is always marked, and very

troublesome and exhausting diarrhœa may ensue as the result of thoughtlessness in the administration of aperients. Great care is required during convalescence, and a change to sea or mountain air is desirable, together with warm clothing and a very nutritious diet.

SCARLET FEVER—SCARLATINA

IN this disease high fever and soreness of throat are associated with the presence of a characteristic rash, appearing usually on the second day of illness. The malady is extremely contagious, and the virus of the disease particularly tenacious of life. The stage of incubation, during which no symptoms exist, is short, from two to seven days, often three or four days only.

Symptoms.

The invasion of scarlet fever is usually acute. A child, apparently in perfect health, is suddenly seized with shivering, or rarely convulsions, sore throat; and rapid rise of temperature. In no other disease is the temperature more quickly raised than in scarlet fever. From the normal it may in a short time run to 103° , 104° , or even 105° . Soreness of throat is nearly always complained of, and vomiting at the outset of the fever is quite common. Accompanying the symptoms already described there are usually *malaise*, pains in the limbs, and loss of appetite. On the second day of the illness, in most cases, the rash appears; it is usually first observed on the neck, chest, and inner side of the thighs, and it very soon involves the whole body. The rash is of a brilliant red colour and is essentially papular, the papules being very close together and very minute. For this reason large areas of uniform redness result, and by drawing the finger across the rash an anæmic streak is produced, which may persist some seconds. The rash continues to spread, and involves finally the whole body. As long as the eruption continues to come out, and until its total disappearance, the temperature remains febrile; but if the fever continues after the disappearance of the rash, a complication may be

suspected. As a rule, the eruption does not last long; in a day or two it rapidly disappears, and is followed by desquamation. Slight roughness of the skin is first noticed, and this branny condition soon gives place to extensive and well-marked desquamation; sometimes the epidermis is detached in large flakes. This is especially the case as regards the hands and feet. Desquamation is usually first noticed about the neck and back. It should be borne in mind that the process lasts a considerable time, as long even as five or six weeks, and that the hands and feet are always among the last portions of the body to present evidence of "peeling." Hence it is always desirable to examine the hands and feet of suspected cases, and especially of children, with great care. The region of the nails should also receive special attention; observance of this rule will often prevent the occurrence of lamentable mistakes of diagnosis. The appearance of the tongue at the outset is somewhat characteristic. It is first of all covered with a white fur, thick and creamy, from the surface of which the enlarged papillæ project; this is the well-known "strawberry tongue" of the disease. In a day or two the fur clears off, cleaning commences at the tip and edges, and proceeds from before backwards. The result is that the tongue is left free from fur, but morbidly red and covered with the reddened points formed by the above-mentioned papillæ.

The throat symptoms of scarlet fever are not usually severe, and when inspected, only dark, almost purple, redness of the fauces is discerned. There may be considerable inflammation of the tonsils, and on the surface of the latter yellowish points, similar to those of follicular tonsillitis, are often noticed. From this condition of throat every grade of severity may be found, up to the most malignant and intense inflammation of the fauces and adjacent parts. In some cases a false membrane is developed, bearing a marked resemblance to that of

diphtheria. In all severe throat lesions the glands of the neck are enlarged ; in bad cases this enlargement may lead to suppuration, and in very severe instances, seldom seen, the inflammation may extend to the skin and subcutaneous connective tissue, producing a most serious form of cellulitis. This may even travel to the skin of the chest, burrowing and undermining the pectoral muscles.

Another very common and serious complication of the disease is otitis. This should always be suspected if the temperature remains up after the disappearance of the rash, or if much pain is complained of in the ear or on swallowing. The inflammation, extending from the throat along the Eustachian tube, is responsible for the ear trouble. As a rule, otitis media results, with perforation of the membrana tympani ; a flow of pus, accompanied with sudden relief of the pain previously suffered, announces this occurrence. The suppuration may terminate, and the patient recover with a perforated membrane ; but too often the discharge continues, and permanent deafness ensues. This, however, is the least important of the resulting troubles, for the persistence of the discharge is fraught with danger even to the life of the patient, and the usual cause of abscess of the brain is neglected ear disease, the result of scarlatina.

Nephritis is an important complication of the disease. As a rule, if it occurs it does so late in the course of the malady, and is particularly liable to arise during the stage of desquamation. There can be little doubt that the poison of the disease has a definite and specific action on the kidney. This action, however, is unquestionably called into being by chills, and one of the commonest incidents in the course of scarlet fever is to learn that, after exposure in the stage of desquamation, the symptoms of nephritis have supervened. These are in all respects those of ordinary acute nephritis. Hæmaturia is by no means uncommon, and uræmic convulsions may occur and carry off the patient. As mentioned already, blood may be met with in the urine, and albumen and casts are, of course,

always present. It will be found that in children nearly all cases of nephritis in scarlet fever are associated with the occurrence of crystals of uric acid in the urine.

Scarlet fever is sometimes attended with articular symptoms. The large joints are chiefly affected; they become swollen, tender, and very painful. In fact, the articular affection is similar to that observed in acute rheumatism. As a rule, these symptoms do not occur at the onset of the malady, but late in its progress, frequently during the stage of desquamation. There is considerable difference of opinion concerning the nature of the joint affection in scarlet fever. By some it is regarded as of rheumatic nature, and is attributed to chill during the stage of desquamation; by others, *e.g.*, Henoch, it is looked upon as a scarlatinal synovitis, and as being essentially a manifestation of the latter complaint. However this may be, it is certain that it may be attended with inflammation of the peri- and endocardium, the latter being by far the most frequent occurrence, in which respect it bears a striking analogy to acute rheumatism.

It cannot be too constantly borne in mind that no disease is more protean in its aspect, more deceitful, so to speak, than scarlet fever. Cases, such as described above, with well-marked rash, sore throat, and rise of temperature are easily diagnosed; but, unfortunately, there is a very large number of instances in which the conditions are quite otherwise. Cases occur in which the rash is so slight and the general health so little affected that they pass undiagnosed; indeed, they may never be presented for medical examination. In such, desquamation is the first indication of anything being wrong. Instances undoubtedly are met with in which there is no eruption whatever from beginning to end, and no temperature or throat symptoms may be observed in another class of case. To be forewarned in this matter is to be forearmed. It should never be forgotten, too, that cases of exceeding mildness may communicate the disease

in a severe, indeed a malignant, form. Disastrous mistakes are often made through carelessness and ignorance. It is a good rule never to allow the question of scarlet fever to be absent from the mind in dealing with children, and in all doubtful cases the most minute and scrupulous attention should be given to the presence or absence of desquamation. We have known scarlet fever to be diagnosed as "influenza," when the least care and attention would have shown that the child was actually "peeling."

Causation
and Morbid
Anatomy.

Scarlet fever is in all probability due to a specific micro-organism, but up to the present time this microbe has escaped recognition. What the scarlatinal poison really is we do not know, although as regards the complications of the disease, the micro-organisms of suppuration, viz., the *streptococcus pyogenes* and *staphylococcus aureus*, play an important part, and it is possible that the diphtheria bacillus may also be a factor in the production of these complications. In addition to the skin, throat, and kidneys, upon which the chief effects of the scarlatinal poison are exerted, it is important to remember that the lymphatic system of glands and vessels is involved in all cases, and in some this system may be so severely affected as to form the predominating feature of the malady. Of all the complications of the disease, that due to infection by the pus-forming microbes is the most frequent, and one of the most important. Next in frequency, though by no means second in importance, comes the renal complication due to the effect of the scarlatinal virus upon the kidney.

Treatment.

The isolation of the patient is the first matter to be considered. A room as far removed as possible from those occupied by other members of the family should be chosen, at the top of the house if practicable. The room should be cleared of all furniture not absolutely necessary; a fire should be kept burning day and night, and in other respects free ventilation, but without draughts, should be arranged for. The nurse must not be allowed to communi-

cate with the other members of the household more than is absolutely necessary. The patient should be kept in bed, but not made uncomfortably hot by an overweight of bed-clothes; a light, but sufficiently warm, covering is all that is necessary. He may quench his thirst with any of the ordinary drinks used in fever. There is no reason whatever why his fluids should be curtailed. Milk will be the staple article of diet, though light puddings, jellies, and custards may also be used to vary it. Should the fever range high, tepid sponging is grateful to the patient and useful in lowering the temperature. In cases of danger from excessively high temperature tepid bathing may be employed, and where great restlessness or delirium are marked features a warm bath (100° to 105°) will often soothe the patient and induce sleep. It is important to take great care of the mouth, throat, and ears. The mouth should be rinsed with disinfecting lotions (boracic acid, permanganate of potash, etc.), and the throat may be swabbed or syringed with the same. The nose also should be carefully cleansed if there is any discharge therefrom. It is important to use only warm water, or very weak solutions of disinfectants, for this purpose. A close watch should be kept on the ear. In very young children it is by no means easy to detect the first symptoms of ear mischief, and a careful examination should be made each day by speculum and mirror if necessary. Should the membrana tympani be found thin and bulging it should be incised. If symptoms of mastoid disease ensue they must be appropriately treated. Drugs are useless in this disease, but there can be no objection to the administration of citrate of potash if it is agreeable to the patient. Chlorate of potash may be used as a gargle if the throat is sore, but its benefits are doubtful. Should renal inflammation supervene, it must be treated according to the rules laid down for the management of acute nephritis. During the stage of desquamation it is advisable to give frequent warm baths, and to use an ointment to the whole external surface.

An ointment of vaseline with one or two per cent. menthol will often prevent the troublesome itching so common at this period.

Great caution must be used in allowing the patient to resume his ordinary life and to mix with his fellows. Not until desquamation has entirely ceased should he be looked upon as incapable of transmitting the disease to others. About six weeks is an average duration before the patient can be considered free from all contagion, but the course of the period of desquamation may be shorter or longer. At the end of treatment it is well to destroy anything worn by the patient which, on account of its cheapness, can be easily replaced. Other articles must be exposed to great heat in properly constructed disinfecting chambers, or must be plunged into boiling water. The room should afterwards be deprived of its paper and thoroughly cleaned in accordance with known rules. Cases of scarlatina in which purulent symptoms due to streptococcus infection are severe have been treated with anti-streptococcus serum, but the results are at present too uncertain for any practical conclusion to be drawn from its employment.

RÖTHELN, OR GERMAN MEASLES

GERMAN measles, or epidemic roseola, was for long regarded as being a mild form of ordinary measles. It appears, however, to be a separate and definite affection, resembling, as regards its rash, scarlatina on the one hand and measles on the other. The cause of the malady is quite unknown.

For perhaps a day before the appearance of the eruption mild febrile symptoms may be present. On the following day the rash, which is by far the most important feature of the disease, appears. It is seen first on the face, but with great rapidity passes down and spreads over the whole body. The eruption consists essentially of raised, reddish, circinate or oval spots, which disappear on pressure. These spots may run together, forming patches, which may cover considerable tracts of surface. The eruption is never so bright red as that of scarlatina, and differs also from the latter in originating on the face. It is more likely to be confounded with the measles rash, but its florid tint is more marked, and it is not arranged in the definitely crescentic manner of measles. There may be coryza, but if so, it is very slight. The whole duration of the disease is usually short, four or five days. The lymphatic glands are not seldom enlarged in this malady, particularly those of the neck. This is an important physical sign, and should not be lost sight of in the diagnosis of doubtful cases. Symptoms.

The chief points of distinction between this affection and measles, the exanthem with which it is most likely to be confounded, are the very short duration of the stage preceding eruption, the mildness of the febrile symptoms, and usual absence of coryza, the

colour and arrangement of the rash, and especially the fact of measles being no protection against an attack of epidemic roseola. In some cases of influenza a rash is present strongly resembling that of the disease in question. The presence of an influenza epidemic and the history of the case will be important factors in making the differential diagnosis. As regards scarlatina, the high temperature, the site of first appearance of the rash, its colour, and the presence of sore throat, all point to this disease rather than to German measles. No complications occur in this malady.

Treatment.

Special measures are not required, but it is advisable to keep the patient in bed until the disappearance of the rash.

VARICELLA, OR CHICKEN-POX

THE incubative period in this malady is of about ten or twelve days' duration. Varicella is a disease chiefly of childhood, but it occurs also in adults.

The onset of the affection may be marked by Symptoms. very slight febrile symptoms, with a temperature of 100° or 101° , but more commonly the appearance of the rash is the first indication of the complaint, the child being in his ordinary health. The rash occurs on the face, the neck, and back; indeed, on any part of the body. It involves also the mucous membrane of the mouth, fauces, and soft palate. The first manifestation of the eruption is a papule of a rosy colour; this quickly becomes a vesicle of the average size of a pea. There is usually no areola to this vesicle, but if present, the redness is very slight. The vesicle contains a limpid fluid, which at a later stage, within twenty-four hours usually, may become turbid or rarely purulent. The vesicles may also be umbilicated. Ordinarily, instead of suppurating, the contents of the vesicle dry up, and in about four or five days a scab is formed which shortly falls off. No trace usually remains of the lesion, but in some rare cases, as the result of suppuration, a cicatrix may ensue. It is very important to know that for two or three days fresh papules continue to form, with the result that all stages of the rash may be observed at the same time; papules are found, and close to them vesicles, together with dried-up contents of the latter, forming scabs. It is often said that the vesicular eruption in this disease resembles the dermatitis produced by flicking very hot water on the skin. This, of course, is highly inaccurate, and it is desirable that such comparison should

be dropped. Cases are sometimes, but rarely, seen in which the varicella eruption becomes gangrenous; ulcers form, and extensive destruction, not only of the skin, but of deeper structures, may ensue. To such cases the term "gangrenous varicella" has been applied. It is, however, certain that in these cases the skin lesion has been merely the point of entrance of infective organisms, and it is to the latter that the subsequent changes are due. That is to say, the disease is a varicella *plus* an infection due to micro-organisms. It has been already mentioned that the constitutional disturbance from varicella is extremely slight, and often nil.

The disease is practically only of importance in relation to the diagnosis of modified small-pox. During the prevalence of epidemics of the latter disease it becomes a matter of much importance, and of some anxiety, to discriminate carefully between the eruptions of chicken-pox and of modified small-pox. In some cases it is almost impossible to be certain, but in the large majority attention to a few points will render the diagnosis easy. The papule of varicella is free from the hard, shotty sensation communicated to the finger by that of varioloid; the vesicles are not usually umbilicated, though this is not by any means an invariable distinction; there is not the same tendency for the rash in varicella to affect the forehead and the wrists that there is in varioloid. It may also be observed that the disease is practically confined to children, so that if an eruption resembling that of chicken-pox occurs in a child, and at the same time in the parent, it is strong, though not conclusive, evidence that the malady is not varicella, but modified small-pox.

Varicella is highly infectious among children, and is usually only suffered from once in a lifetime.

Treatment.

A child ill with the complaint should be isolated, but otherwise requires no special treatment. He should be prevented as far as possible from scratching the irritable cutaneous lesion, in order to avoid the risk of cicatrisation.

VARIOLA—SMALL-POX

THE incubation period of variola is generally twelve days or a fortnight ; it may be longer or shorter, but the average is as just stated. As a rule, symptoms are entirely wanting during this stage. When the disease is produced by inoculation of the virus, the incubation stage is usually about eight days ; it may be even shorter.

The invasion is nearly always sudden in onset, Symptoms. with fever, severe pain in the back, and vomiting. In the case of children, the invasion is often attended by convulsions. In some cases severe epigastric pain is complained of at this period. The temperature rises at once, and may rapidly attain 103°, 104°, or even a higher range. The pain in the back may be very severe ; in some cases it is so slight as scarcely to call for notice. Rashes are sometimes observed at this period of the malady, anticipating the evolution of the characteristic variola eruption. They are usually erythematous, but may be very similar to that of measles, leading to considerable difficulty of diagnosis. Women the subject of small-pox nearly always menstruate, whether the period is due or not, and those who are pregnant are almost certain to miscarry. The febrile symptoms continue, and the temperature rises or remains stationary until the third day, when usually the small-pox rash appears. The eruption may appear earlier, or may be deferred for several days, but the usual time for its appearance is as given above. The rash at the earliest period consists of spots of hyperæmia, which rapidly become papules. These papules have a peculiar feel, as if embedded in the skin ; the sensation communicated to the

examining finger has been compared to that produced by shot occupying a similar position. The spots are of a pale red colour, and are at first most prominent on the forehead and wrists; these localities should, therefore, always be carefully observed in suspected variola. The eruption rapidly spreads so as to cover the whole body; it is not confined to the skin, for it affects also the mucous membranes, and may be observed in the mouth and on the fauces. There can be little doubt that it may, and often does, affect the gastro-intestinal mucous membrane, and it may also be observed on the conjunctiva and cornea. Not seldom considerable swelling of the hands and feet occurs during the coming out of the rash. The papules very soon, by the transudation of serum, become vesicles, and by the fourth or fifth day usually the eruption is completely vesicular. During the development of the vesicular stage the temperature remains febrile, and all the symptoms of the condition persist, but when vesiculation is complete the temperature falls, it may be to the normal, and the patient feels comparatively comfortable. Should the case be one of modified small-pox or varioloid—that is, variola occurring in a person who has previously had the disease, or who has been protected by vaccination—the full development of the vesicular stage of the rash may be the end of the disease. In such cases the contents of the vesicles dry up, are detached in the form of scabs, and the patient becomes convalescent. But in cases of the unmodified malady, after a further interval of forty-eight hours, more or less, suppuration of the vesicles takes place, with renewed elevation of temperature. This is the stage of *secondary fever*. The fever may attain a degree as high as that of the previous stage, or even higher. The contents of the vesicles become purulent, and the pustules show marked umbilication, or depression of their centre. Delirium is very common at this period, and dangerous complications may ensue. Pneumonia and pleurisy may supervene, hæmaturia is not uncommon, or severe diarrhœa

and vomiting may set in. If pustules be situated upon the cornea, perforation of the latter may ensue, with irremediable damage to vision. These complications are all the more likely to occur in the severe form of the malady to which the term *confluent* is applied. In confluent small-pox the stage of pustulation of the rash is very well marked, and the pustules tend to run together, with deep and severe ulceration of the skin. Great swelling attends this process; so great, indeed, that the patient may be absolutely unrecognisable by even his intimate friends. A very foetid and characteristic odour is given off in the confluent cases. It is during the pustular stage of the rash that the destruction of the skin occurs which gives rise to subsequent "pitting" and scarring. By the eighth day of the disease the maturation of the pustules is usually complete; in favourable cases they now dry up, and the stage of desquamation sets in. With the drying up of the pustules the fever comes to an end, and the patient enters on the period of convalescence. The scabs generally have fallen off about the tenth or twelfth day, and later than this desquamation becomes marked; it may be very abundant, and the scales large. It lasts usually until the twentieth day, but may continue still longer. The detached scabs and desquamation generally are often accompanied by a very offensive odour, and it must not be forgotten that both scabs and scales are highly contagious.

From what has been already described, it will be understood that variola is a disease liable to many and great varieties in its clinical manifestations. In its very mildest form no eruption whatever may follow well-marked symptoms of invasion; this modification is known as *variola sine variolis*. The next variety in order of severity is that known as modified small-pox, or *varioloid*, in which the disease ends with the vesiculation of the rash, and no secondary fever occurs. Confluent cases are those in which the stage of suppuration is very marked and severe; in them the fever is high, liability to complications great,

and the outlook serious. Another very grave manifestation of the disease is that to which the term "hæmorrhagic" is applied. Hæmorrhage into the skin or from the mucous membranes may in this form occur during the invasion of the disease, or it may be deferred until the stage of secondary fever; in all such cases the prognosis is most grave, nearly all cases of hæmorrhagic variola being fatal. We have seen hæmorrhagic small-pox terminate fatally within twelve hours of the invasion of the disease.

Causation
and Morbid
Anatomy.

Nothing definite can at present be said as to the morbid principle in variola; its discovery lies in the future. Numbers of micro-organisms have been described as existing in the pustules, but their relation to the malady is clearly not that of cause and effect. Thus bacteriology has not, so far, enabled the actual micro-organism upon which the disease probably depends to be demonstrated. Variola is an extremely infectious disease, and the morbid virus is very tenacious of life, and difficult to destroy.

The morbid changes in variola affect the internal organs, and more especially the skin. As regards the internal organs, the changes observed are those incidental to high fever; softening, swelling, and change of colour are noticed; the spleen is often very large and soft. But these alterations are in no wise characteristic of the disease; they are met with in any malady accompanied with a high temperature. Much more characteristic are the changes observed in the skin. The cutaneous inflammation of variola is a deep inflammation, and is not confined to the superficial layers, but involves the cutis vera. The usual appearances of inflammation are observed, and the effused fluid, by raising up the epidermis, gives rise to the characteristic vesicle, which is multilocular, and does not therefore collapse on puncture. It is on account of this deep inflammation of the skin that scarring results. Deep and severe ulceration of the skin may ensue in the course of variola, and when this is the case infection with pyogenic organisms of the exposed surface has occurred.

Concerning the diagnosis of small-pox, as a rule this gives rise to but little difficulty, especially when the disease is epidemic; but when sporadic cases occur, as at an early period of an epidemic, the case is different. Varicella arising under these circumstances may give rise to perplexity. It is very important to clearly understand that varicella and variola are two totally distinct diseases. The points of difference between them will be found set out under the description of chicken-pox. The violent pain in the back may give rise to error in diagnosis, and it is liable to be diagnosed as lumbago. The febrile symptoms of the invasion of variola present no distinctive feature, and in combination with prodromal rashes may lead to an erroneous diagnosis of scarlatina or measles, according to the nature of the eruption. The only other point in this connection to which it is necessary to refer is the danger of mistaking medicinal rashes for that of small-pox. This especially applies to the iodide of potassium rash. As regards all these different points, to be forewarned is to be forearmed. The only way to avoid error is to bear in mind the various pitfalls which surround the diagnosis. Whenever a case is doubtful it should be at once isolated and closely watched; in other words, the community should be given the benefit of the doubt. This is the only safe rule to follow.

As regards prevention of the disease, the earliest possible notification and isolation of the case are, in conjunction with general and efficient vaccination, the only sure methods. In all cases when an epidemic occurs, re-vaccination should be performed. Concerning the disease itself, small-pox, as is the case with other infectious maladies, runs its own course, which we are powerless to modify in its essential features. All that can be done is to put the patient under the most favourable conditions as regards nursing and the administration of nourishment. Complications should be as far as possible anticipated and prevented. The diet must consist of the usual aliments

Treatment.

suitable to the febrile condition: milk, beef-tea, broths, jellies, custards, etc. Drugs are seldom required, but there can be no objection to the administration of saline or effervescing draughts, which are sometimes grateful to the patient. In view of the fact that the eruption tends to involve the intestinal mucous membrane, with consequent diarrhœa, caution should be observed in the administration of aperients. To prevent pitting in the confluent cases is urgently desirable. Exclusion of the air and the application of some emollient substance will generally be efficacious in this sense; glycerine and water, or weak carbolised oil, may be used, and when crusts are abundant they must be removed by the application of warm olive oil or linseed meal poultices to the face. It has been thought that the exclusion of the chemical rays has some influence in preventing pitting. There can be no objection to covering the windows and doors with red curtains, provided that free ventilation without draughts is not interfered with. In hæmorrhagic small-pox but little can be done; it is almost invariably fatal, and to administer ergot, turpentine, and other styptics with the view of arresting the hæmorrhage is perfectly futile.

The greatest attention must be devoted, in case of death, to the disinfection of the corpse, and in all cases the rooms, clothing, etc., used by the patient must be thoroughly disinfected, bearing always in mind that the tenacity of life of the small-pox poison is of the greatest development.

VACCINIA

THIS is a malady affecting the udders of cattle ; it is a general disease, of which the eruption on the udders is the local expression. There can be no doubt that it is due to a specific virus, though all efforts to isolate the specific agency have hitherto been unsuccessful.

The eruption of the disease in cattle consists of vesicles bearing a resemblance to those of small-pox. The identity of vaccinia with the malady known to veterinary medicine as "horse-pox" was first established by Jenner. By inoculating the matter obtained from the disease known as "the grease" in horses—which disease is identical with horse-pox—Jenner succeeded in obtaining the manifestation of vaccinia in cattle the subject of his experiments. He further made the discovery that this disease, vaccinia, which is communicable to man, when inoculated on human beings produced a mild form of the disease, and that persons so inoculated were insusceptible of the contagion of variola. In other words, an attack of vaccinia protects the person who has suffered from it from being attacked by small-pox. All subsequent experience has tended to confirm the truth of Jenner's discovery, and there can be no doubt that the practice of vaccination has done more in reducing the ravages of this deadly disease than all other agencies, hygienic and other, put together. Recent retrograde legislation has, unfortunately, exposed this country to grave risk of a revival of this terrible disease. It is a calamity that the nation as a whole should be imperilled through the ignorant and fanatical enthusiasm of the anti-vaccination party.

The degree of protection conferred by vaccination

varies considerably, but there is no doubt that, with the lapse of time, it tends to become weaker and weaker, until it finally disappears. In recent vaccination the protection is absolute, and if the degree of protection is insufficient to prevent the patient from contracting the disease, nevertheless its manifestations will assume the mild form known as modified small-pox. The degree of protection also depends upon the efficiency with which the operation is carried out, but under the most favourable circumstances it is certain that vaccination should be again performed at or about the age of puberty. There is reason to think that it is desirable to perform the operation at intervals of about seven years after this proceeding. It is certain that when epidemics of variola break out, re-vaccination should be at once performed, and without regard to previous re-vaccination.

When lymph taken from the vaccinated human being is inoculated on a previously unvaccinated person, the sequence of events is as follows:—slight redness of skin generally follows the operation, and on the third day papules appear, corresponding usually in number with that of the incisions. These papules speedily become vesicular, and the vesicles are well developed by the fifth or sixth day. They contain at this time clear fluid, and are umbilicated and flattened at the summit. By the eighth day the vesicles are mature, and are surrounded by a red areola. The contents of the vesicle, previously thin and watery, now become of a more tenacious consistence, but retain a clear appearance. The contents ought never to become purulent; if this happens, it proves infection by pyogenic organisms, the *streptococcus pyogenes* and *aureus*. By the tenth day the fluid contents have become cloudy, and tend to dry up. About the fifteenth day the process of desiccation has resulted in the formation of a scab, which drops off on or about the twenty-second day. A characteristic glistening scar is left. During these successive developments mild febrile

symptoms are present, with loss of appetite and slight disturbance of stomach and bowels. In some cases rashes occur on the skin soon after vaccination has been performed; they are often erythematous, but are sometimes herpetic or papular, and are quite transitory. During the process of scabbing, and sometimes much earlier, there is often great irritation at the seat of the operation, and the axillary glands of the corresponding side may become enlarged and tender.

By the ignorant all rashes following vaccination are invariably attributed to the pernicious effect of the proceeding. As a matter of fact, the intense irritation which is present leads to scratching; suppuration occurs, and the pus is inoculated anywhere and everywhere over the body. A profuse eruption of impetigo contagiosa follows, which is erroneously attributed, as a direct consequence, to the operation.

Much of the prejudice against vaccination is due to the idea that syphilis and other diseases may be transmitted from one child to another. There would appear to be clear evidence that syphilis has been transmitted in this way, and almost certainly by the inoculation of blood as well as lymph. As regards leprosy it would seem that under no circumstances is the risk of transmission more than nominal; but in order to guard against any possible contamination in this sense, it is becoming more and more usual to employ calf lymph. The lymph is prepared under adequate supervision, and with such precautions that all risk is avoided. When calf lymph is used, the same series of phenomena are observed as those described above, but all the different stages are delayed, and also the constitutional symptoms are more severe. Whereas in vaccination with humanised lymph the vesicle is fully developed by the eighth day, when calf lymph is employed, maturation is postponed by several days. The vesicle does not dry up so early, and the crust is not detached before the twenty-eighth day, or even later.

As is the case with the vesicle of variola, the vaccine vesicle, when punctured, does not collapse ; it is multilocular. The inflammation affects the skin deeply, the cutis vera being involved, and the vesicle results from the epidermis being raised by the transudation in the deeper layers of the skin. It is on account of the cutis vera being implicated that, as in small-pox, scarring results.

When a patient completely protected is vaccinated, no result whatever, either local or general, may follow. The reaction varies according to the amount of protection, and attains its highest development when the latter is nil.

It is scarcely necessary to say that in whatever manner the operation be performed, vaccination should be carried out with the most scrupulous antiseptic precautions. The lesion, too, must be protected from irritation. The point of insertion of the deltoid is that usually chosen, but there can be no objection to other localities being selected, if, as is sometimes the case, the usual locality be taken exception to on æsthetic grounds.

FEBRICULA, OR SIMPLE CONTINUED FEVER

CASES are met with from time to time, especially in the persons of children and young people, in whom febrile symptoms occur, often after slight exciting causes, which it is impossible to classify as those of enteric or other specific fevers, or indeed of any definite malady. Such patients have been described as suffering from *simple continued fever* when the duration of the malady has been a week or ten days, from *ephemeral fever* when its duration is a day or two only. It has been said that in these cases a trifling exciting cause may be assignable. Very often such cause is indigestion, due to over-eating, or to fatigue and anxiety. Exposure to cold or to bad smells may also excite an attack of febricula, and certainly cases sometimes occur during epidemics, such as that of scarlet fever, in the cases of nurses and others who are protected against the attack of the epidemic malady.

The following is a typical instance of febricula. Symptoms. A schoolboy, aged fifteen, had indulged largely in strawberries and cherries; the next day he complained of feeling ill, and a few days later, not getting better, he took to bed. From the first his temperature had been raised, attaining the height on several occasions of 104° . There was complete loss of appetite and marked acceleration of pulse, together with a severe headache. Epistaxis occurred once only. The case was suspected to be one of typhoid fever; no spots were discoverable at any period of the illness. The throat had not been sore. After the expiration of a fortnight the temperature began to range lower, and became normal within the next week. The appetite was recovered, he

became rapidly stronger, and at the end of three weeks was perfectly well in all respects. This case shows in a very clear manner the dependence of the symptoms upon error in diet, and the extreme difficulty, or impossibility, of differentiating between this malady and enteric fever. For quite ten days this case was regarded as one of mild typhoid fever, but at the end of that time it became clear that this view was erroneous.

The symptoms in all cases of simple continued fever are much as described above. The fever may be high, the temperature ascending even to 105° , with thickly-furred tongue, constipation, and scanty passage of urine, which is loaded with urates. Pains in the back, limbs, and body generally are often a marked feature, and labial herpes is by no means uncommon. Physical signs are entirely absent in most cases, but in some slight pharyngitis may be present. At the end of a week, ten days, or a fortnight, all the symptoms vanish, and the patient is practically well, there being no sequelæ.

The difficulty of distinguishing this fever from enteric fever has already been referred to. Sometimes it is most difficult to exclude the possibility of tuberculosis, except by the result. The prognosis is in all respects excellent; all cases recover unless some unforeseen complication occurs. There cannot be said to be any definite knowledge on the subject of the pathology of this malady, as it is never fatal.

Treatment.

This consists in keeping the patient in bed, and giving light, easily assimilable food. If necessary, aperients must be administered, and salines are sometimes grateful to the patient.

ENTERIC FEVER—TYPHOID FEVER

THIS is a continued fever, running a course of several weeks, resolving by lysis, and attended with much prostration, and with the development of a typhoid state. It depends probably upon the agency of a specific organism, the typhoid bacillus of Eberth.

The onset of enteric fever is almost always gradual. Symptoms. Without apparent cause the patient is observed not to be in his usual health, and he probably describes himself as "bilious." He complains of headache, lassitude, pain in the limbs, loss of appetite, and perhaps nausea; he thinks but little of his troubles, and hopes they will pass off shortly. Day by day, however, it is noticed that he is becoming worse, so that at the end of a few days, or perhaps a week, he remains in bed, feeling too ill to follow his usual avocations. Not infrequently, in addition to the symptoms already mentioned, there is slight diarrhoea; two or three times a day the bowels act, the motions being loose and perhaps light-coloured. Epistaxis is sometimes an early symptom, and incontinence of urine is a rare occurrence in an early stage of the malady. If the patient is examined at this period he is dull and wearied in expression, wishing only to be let alone. When the abdomen is examined it is found to be distended and tense; the spleen, if carefully palpated, will probably be found enlarged, and investigation may show the presence of the characteristic rash. This consists in minute papules, the size of the head of a large pin, of a bright red colour, distinctly raised to the touch, and disappearing on pressure. Such spots may be met

with on any part of the body, and when not to be found on the chest and abdomen may sometimes be detected on the back. In the course of the second week of the illness the typhoid condition becomes fully developed. The patient is in a very prostrate state, lying on his back with his eyes half-closed, taking no notice of what is passing round him—barely answering questions. At night he is probably slightly delirious, and he may wander mentally during the day. The pulse is soft, compressible, and rapid; the first sound of the heart is weak, and may be almost inaudible. The tongue is dry and may be cracked, covered with a brownish yellow fur; sordes are observed on the lips and teeth. The abdomen is even more tense and distended, and the enlargement of the spleen more marked. The rash continues to come out. There may be profuse diarrhœa, the bowels acting many times in the day, and the motions passing involuntarily. Retention of urine may also occur. In favourable cases the patient begins to amend, though very gradually, towards the middle or end of the third week. The diarrhœa, if present, becomes less urgent; the mental condition becomes clearer, and nocturnal delirium ceases.

From the commencement of the illness the temperature gradually rises; there are morning remissions and evening exacerbations. During the early stages of the fever the morning remission is less than the evening exacerbation, so that the temperature ascends. By the end of the first week the remissions are so slight that the temperature becomes practically that of continued fever, which persists during the stage of greatest intensity, when the ulceration of Peyer's patches is at its highest development; then, when amendment begins, the temperature commences to remit in the evening. Gradually, and in the course of some days, the morning remissions become more marked than the evening exacerbations; the two points begin to approximate. Finally, this is the case, and at the end of the fourth week, or thereabout, the

temperature may be quite normal, or not infrequently subnormal.

It is not unusual for the termination of the febrile stage in enteric fever to be followed by desquamation. This process is found to be most copious on the limbs, and especially over the abdomen, but is also seen on the chest, in the axillæ, and to a less extent on the head and extremities. We have seen desquamation so marked a feature of convalescence that, had the patient been seen for the first time, it would have been difficult to say that he was not recovering from scarlatina.

The number of white corpuscles in the absence of inflammatory complications is not increased, and may even be diminished in this fever. Should such complications arise, pneumonia or peritonitis, for example, a leucocytosis appears invariably to ensue, and may be very marked.

Convalescence in this disease is long and tedious, and in some cases the original good health of the patient is never recovered.

The complications of enteric fever are numerous and important. Reference has already been made to the subject of diarrhœa. In some cases there is none; on the contrary, the bowels may be constipated throughout. In others, however, the diarrhœa may be so profuse and continuous that life may be imperilled by exhaustion. Hæmorrhage from the intestine may ensue. This is by no means an uncommon complication, and it may be a very dangerous one. It is obviously impossible for hæmorrhage to occur until ulceration has been well established; thus it is not met with before the tenth day of the disease, and is generally observed during the third and fourth weeks. Profuse hæmorrhage is detected by the sudden fall in the temperature from perhaps 104° or 105° to normal or subnormal, with collapse and pallor of the patient, and the appearance of blood from the bowels. One of the most important and fatal complications of the malady is perforation into the peritoneal cavity. This is, like

hæmorrhage, most common in the third and fourth weeks; clinically, it is shown by a fall in the temperature, distension and extreme tenderness of the abdomen and the *facies* characteristic of acute peritonitis. The nervous symptoms may be so severe as to constitute a grave danger. Very commonly there is, in addition to muttering delirium, tremor of muscles and picking at the bed-clothes, both very unfavourable symptoms; patients who have been addicted to alcoholic excess are particularly liable to this variety of nervous failure. In no case of enteric fever is bronchitis absent, but it is usually mild and of no great importance. In other cases, however, it may be a most dangerous complication, manifested by dyspnoea, cough, blueness of face, and failing pulse. Not uncommonly the inflammation, extending from the bronchi, causes bronchopneumonia, with all its attendant dangers. Œdema of the lung is, too, in such cases of not infrequent occurrence, and in addition to bronchitis and lobular pneumonia collapse of the lung is not seldom met with. It is due to the presence of bronchitis impeding the access of air to the portion of lung about to become collapsed, and to feeble inspiratory power, as well as to the recumbent position of the patient. Pulmonary complications are very fatal in typhoid fever, except as regards the frequent bronchitis of the large tubes, which, if it remain confined to these tubes, is of little moment. Lobular pneumonia is chiefly found in prolonged cases, and in those in which relapse has occurred; collapse nearly always accompanies it. Occasionally the height of the temperature becomes a cause of anxiety. The temperature, at the early stage of the case no higher than usual, may in the course of the second or third week attain 105° or even 106°, and, with but slight remissions, remain at a dangerous elevation. Such cases are always serious. The patient is very prostrate, often delirious, and the heart's action becomes greatly weakened. The pulse is, therefore, very small and soft, often dicrotic. Pulmonary complications, in such a condition, do not delay

their appearance, and in no long time the patient succumbs from oedema of the lung, induced by the hyperpyrexia and consequent feebleness of heart. In these cases it is not unusual for the abdominal symptoms to be comparatively mild, and, post-mortem, the ulceration of the ileum is neither extensive nor deep.

Enteric fever in children follows a very different course to that of adults. First of all, it is nearly always a much milder disease in every way. In the next place, the temperature has not the more or less characteristic chart of that of adults. In children the tendency to remission is far more marked than in grown-up people, and so much is this the case that the disease has been termed "infantile remittent fever" when occurring in childhood. The liability to diarrhoea is far less marked in children than in grown-up people; very often there is no looseness of bowels at any period of the complaint, and it is quite usual for constipation to characterise the whole illness. Perforation in childhood is of very rare occurrence.

It is extremely important for the student to be familiar with the fact that enteric fever in childhood differs in these respects from the same fever in adults, otherwise he may fall into serious error. He should be especially careful not to mistake for catarrh of the stomach that which is really the much more important disease—enteric fever. Formerly the term "gastric fever" was employed; if used at all, which is undesirable, it should be recognised as synonymous with enteric fever. There is often considerable difficulty in distinguishing between acute gastric catarrh and enteric fever. When the least doubt exists, the more serious disease should be assumed to be present.

The other great difficulty in enteric fever is to diagnose it from tuberculosis. Not unfrequently it is absolutely impossible to make the diagnosis as between the two maladies, and nothing but the result settles the question. None of the differences usually brought forward are absolutely decisive: the spleen is more

often enlarged in typhoid than in tuberculosis. Spots are common in enteric fever, but a rash indistinguishable from that of the fever has been observed in tuberculosis; diarrhœa occurs in both conditions, but is more common in tuberculosis; adventitious sounds in the chest, moist and dry, are met with in both diseases. If the course of the disease is carefully followed, however, in no long time the diagnosis may be made; for in enteric fever the tendency to recovery is marked, whereas, although the course of tuberculosis may be varied by intervals of improvement, these are not lasting, and the child invariably succumbs.

Enteric fever in children often shows a tendency to terminate about the end of the second week. At the time when, in adults, the typhoid stage would be developing, the temperature in children often touches the normal, and finally attains it about the fourteenth or fifteenth day of the illness. This feature of the disease is a very important one, and is of frequent occurrence. It is on a par with the general mildness of the affection in young subjects. During convalescence the temperature often remains subnormal for some weeks, and the pulse becomes irregular. The latter peculiarity may be present after any prolonged febrile affection, but is especially marked in the convalescence of enteric fever in children and young people.

Speaking generally, when a child has been suffering for some days or a week with indefinite symptoms and some fever is present, in the absence of all physical signs it is extremely probable that the malady is enteric fever. In such cases neither the presence of enlarged spleen, of eruption, or of diarrhœa must be insisted upon in order to establish the diagnosis.

The sequelæ of enteric fever are very numerous. Prolonged debility is of quite common occurrence. Occasionally abscess in an abdominal gland results; plugging of veins may ensue, especially in those of the lower extremities, producing a condition similar to phlegmasia dolens. It is not usual for other specific fevers to immediately follow

enteric fever. Nevertheless, we have seen scarlatina develop in a patient barely convalescent from typhoid fever. Mental changes may occur; patients sometimes pass into a fatuous condition, remembering nothing of their previous state, and becoming more or less imbecile. Mania even is known to have followed typhoid fever. Tuberculosis sometimes arises, and carries off the patient. Not infrequently obstinate constipation occurs in cases otherwise running a favourable course, and may cause much trouble. A very rare sequela is peripheral neuritis. Nevertheless, such cases are met with from time to time. The peripheral neuritis may be very extensive, and if the respiratory muscles become involved, serious danger to life may arise.

There is perhaps no other disease in which danger threatens from so many sides. It is never wise, even under the most favourable circumstances, to give an absolutely assured prognosis; at any moment complications may arise, and from many different quarters. Even in the stage of convalescence a slight error in diet may light up a relapse, or may, indeed, cause death from perforation. In the enteric fever of adults, therefore, the greatest caution is required in anticipating the ultimate result. In children, as already mentioned, it is quite otherwise. In them recovery is the rule, death the exception. It may almost be said that, in children under puberty, death never occurs in cases watchfully treated and carefully nursed.

The lesion in typhoid fever consists in inflammation of the solitary and agminate lymphatic glands in the small intestine, especially in the lower portion of the ileum. It has been ascertained that for the first nine or ten days of the fever Peyer's patches are swollen and enlarged, so that they project above the surface of the mucous membrane. After the tenth day, ulceration commences in these inflamed glands. In the course of the third week the sloughs separate from the surface of the ulcers, which are, unlike the tubercular ulcer, placed in the long axis of the intestine, and are entirely free from thickening either of

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the edges or floor. At post-mortem examination of cases fatal in the third or fourth week some of the ulcers may be found healing, while others are only just commencing, and others, again, are so deep that the floor of the ulcer is formed of peritoneum only. This ulceration may affect the ileo-cæcal valve, and may be found also in the large intestine; but in the small intestine, as already mentioned, it is confined to the lower few feet, from below upwards, of the gut. Sometimes in the large intestine ulceration is very well marked, covering extensive areas. In cases in which death occurs from hæmorrhage, it is not unusual to find the open artery in the centre of an ulcer. During the course of the third and fourth weeks the ulcers, in favourable cases, heal up; but it can readily be understood that many weeks must elapse before the integrity of the intestine is restored so that no risk of perforation remains. The mesenteric glands in fatal cases are almost always found to be considerably enlarged, and they may contain abscesses. This is not, however, a usual occurrence, but abscesses formed in this way may be a serious sequela of typhoid fever. Bronchitis is always present, and pneumonia of the bases may occur. In some cases the heart muscle, especially that of the right heart, has undergone fatty or other changes, probably the result of high temperature. Lobular pneumonia is often present in fatal cases, and with the patches of consolidation those of collapse are invariably associated. Œdema of the lung is of frequent occurrence in a very severe form; the spleen is always enlarged, and may be very markedly so. The internal organs generally manifest the changes incidental to a persistently high temperature.

In all probability the disease is due to the ingestion of a microbe, contained in the evacuations, which abounds in sewage containing water, and possibly in polluted air. This microbe is known as the *typhoid bacillus* (Eberth), and is now differentiated from the *bacillus coli communis*, with which it was until recently

confounded. The bacillus is actively motile, and is found not only in the fæces, but also in the intestinal ulcerations, and in the internal organs of those suffering from typhoid fever. This bacillus appears to be constantly present in the disease, and it can be artificially cultivated. Hitherto it has not been possible to transmit enteric fever by the inoculation of cultures of the bacillus. A test for typhoid fever, devised by Widal, depends upon the clumping together and cessation of movement of the typhoid bacilli, taken from a culture, when blood from a patient suffering from the disease is added to them, and the result observed microscopically. The procedure requires access to cultures of Eberth's bacillus, which must, of course, involve the use of an incubator. Thus the practical application of Widal's test must remain very limited, and indeed occasion for its use seldom, or never, arises, as the diagnosis of enteric fever is by no means difficult, and the results of bacteriological methods are apt to be exceedingly fallacious. Further, it has been conclusively shown that Widal's reaction may occur when the case is other than typhoid fever—malignant endocarditis, for instance. Another, but uncertain, test for the presence of typhoid fever is known as the diazo-benzol or Ehrlich's test. To carry out this test a portion of urine is added to a solution of nitrite of sodium, together with hydrochloric and sulphanilic acids. Liquid ammonia is poured into the mixture; should the urine be that from a case of typhoid, a crimson ring is produced. Unfortunately, the same result may ensue when the urine is that of a patient suffering from pneumonia, etc.; the so-called test is probably of little or no value.

The ordinary mode of contagion is by food or drink, generally the latter. There can be no doubt that most cases arise from the drinking of foul water, and there is reason to believe that oysters inhabiting impure water may have been the medium by which the disease was contracted. Polluted milk is also a fertile cause of the disease. Typhoid fever is not in the ordinary sense infectious, the cases in

hospitals are treated in ordinary wards without the disease spreading; but there is no doubt that the faecal evacuations of typhoid patients are highly dangerous. They should therefore be always disinfected before being got rid of.

Treatment.

It is very important that the case be diagnosed early, in order that the patient may be put to bed and kept there. In some cases of typhoid the symptoms are so slight, and the patient feels so little ill, that he never takes to his bed during the whole course of the disease. Such cases are known as "ambulatory" typhoid fever. There is great danger, however, of sudden perforation in the third week of these cases, and there can be no doubt that the sooner the patient is put to bed the better chance he has of making a satisfactory recovery.

Skilled nursing is of infinite importance in this disease, far more important than any kind of medication. The feeding of the patient is also of supreme moment. Solid foods must not be administered. Milk, either pure or peptonised, or mixed with barley-water, should be the chief food. It should be administered every two or three hours, so that the patient takes about two pints in twenty-four hours. Beef-tea may also be allowed, and milk made up in the form of blanc-mange, or custard and eggs, is also admissible. The great point is to give food which shall cause no irritation to the intestines and which shall pass over the ulcerated Peyer's patches without doing harm. Many cases affecting adults, and in nearly the whole of those of children, require no stimulants whatever. They should never be ordered, which is too often the case, as a matter of routine. As a guide to the administration of stimulants, no better means of ascertaining their necessity exists than the state of the pulse. Extreme rapidity, with dicrotism of marked character and feebleness, calls for the administration of brandy, whisky, or champagne. If no complications occur, nothing is better as medicine than some dilute hydrochloric acid, with syrup and water, given three or four times a day. Should severe

diarrhœa exist it should be checked with bismuth, chalk, catechu, or acids. But if the diarrhœa is but moderate it may be left alone. For sleeplessness and agitation nothing is better than opium; it may be given as pure opium in pill, or as Dover's powder. Its effects in tranquillising the patient and procuring sleep are usually most satisfactory. Should hæmorrhage occur, opium and lead pill, if made fresh, are often useful; but we have generally obtained more satisfactory results from the administration of oil of turpentine in doses of 15 or 20 min., and given in almond mixture. Should perforation occur, death is almost certain from the acute peritonitis which invariably follows. In such cases all that can be done is to give large doses of opium in order to get the patient as quickly as possible under its influence, and to keep him under the effect of the drug. When death threatens from bronchitis or lobular pneumonia and œdema of the lung opium must be carefully avoided, and everything possible should be done by position and by the administration of stimulants to tide the patient over the danger due to the chest complication.

When the temperature finally falls the greatest care must be taken in returning to a more solid diet. The management of the case at this time often taxes the resources and patience of both doctor and nurse to the uttermost. The fever has passed, and the patient feels very hungry. Too often the friends cannot be made to see the necessity for extreme caution in the matter of food, and think that unnecessary precautions are being taken. In hospital practice the uneducated friends of the patient convalescent from enteric fever are particularly apt to yield to his entreaties; food is smuggled to his bedside on visitors' days, and it is not unusual to meet with cases in which relapses are brought about, and, indeed, in which perforation occurs, from the foolish weakness of the patient's friends in this respect. We have seen acute peritonitis from perforation in a convalescent typhoid case,

and at the post-mortem examination grape seeds were found just outside a ruptured half-healed Peyer's patch, the disaster being obviously due to their irritant action on the erosion, which was yet too weak to withstand it. It should be an invariable rule that no change is made in the diet of the patient until for a full week the temperature has remained at or below the normal. Then the change to more substantial dietary should be made very slowly and with great caution. At first, bread made soft by being sopped in milk should be given, and the effect carefully watched. Should any rise of temperature occur, the diet should again revert to a fluid form. If relapses occur they should be treated in the same manner as the original fever.

Long and abiding weakness generally follows enteric fever. The patient should have change of air, and quinine and strychnine may be given as tonics. For months afterwards care should be taken in the matter of food, and all indigestible substances should be carefully avoided.

A word should be added on the subject of high temperature in enteric fever. If the temperature goes to 105° or higher the best plan is to reduce it by cold or tepid sponging. This will generally bring the temperature down, and is safe and agreeable to the patient. This is more than can be said of the treatment formerly much employed in hospital practice of reducing temperature by cold baths. We disapprove of this treatment, never having seen good results ensue. Further, the administration of anti-pyretic drugs is objectionable. They should not be used in this disease.

It has been found that inoculation of animals with sterilised cultures of Eberth's bacillus renders them immune to the disease. Hence it has been thought that the injection of the serum of such protected animals into the human organism might have an influence in averting the progress of the malady, or, at all events, in protecting against its attacks. It may be said at once that experience has not established the first of these aspirations, and with

regard to the beneficial effects of the serum treatment in preventing the appearance of the malady in those exposed to its attack, it is yet far too early to give a definite opinion on the subject. Judging, however, from the excessive prevalence of enteric fever in the recent South African campaign, and this in spite of the so-called protective inoculations, it is justifiable to hold an extremely sceptical attitude concerning the benefit of serum therapy in typhoid fever.

TYPHUS FEVER

THE incubative period of this fever varies considerably in length. It is often nine or ten days, but may be much longer and also shorter, not more than three days. As a rule, there are no symptoms during this stage.

Symptoms.

The invasion is sudden, and the first symptom is usually shivering and a sensation of cold. The temperature rapidly rises, it may be to 104° or 105°, the higher temperature being often attained by the third day; there are morning remissions of temperature, but they are slight. Severe headache is complained of, and from the first the weakness is extreme. Insomnia is nearly always present. It is not uncommon for epistaxis to occur early in the disease, about the third or fourth day, but often this symptom is so slight as to be overlooked. It will be remembered that when occurring in enteric fever, epistaxis is observed at a later stage, the end of the first or during the second week. The pulse is very rapid and weak, and is often dicrotic.

An early symptom of the disease is delirium. This is usually of the low, muttering kind, but is not uncommonly active and busy, the patient talking to himself about his occupation, his plans, and the studies congenial to him. It may, in some cases, be of a furious and maniacal character. The tongue, when protruded, is tremulous; it is covered with brownish, yellow fur, and soon becomes dry, brown, and fissured, as in enteric fever; the teeth also become covered with sordes. The characteristic rash usually appears on the fourth or it may be the fifth day, and is first seen on the sides of the chest, extending to the abdomen, arms, and legs.

The essential lesion is a macule, not a papule as in typhoid fever, and the whole comes out at once, not in successive crops, as in the latter malady. The macule is small, of a dark, mulberry red colour, and when first developed disappears on pressure. At a later stage it does not disappear when pressure is applied, owing to hæmorrhage having occurred into the skin; in fact, a petechial rash has resulted. In severe cases the rash may be petechial from the first. The eruption tends to endure throughout the whole course of the fever, and has been known to exist even when the patient became convalescent. A certain amount of mottling of the skin is nearly always present in addition to the characteristic rash. No improvement of the general condition attends the development and maturation of the rash; on the contrary, all the symptoms become more marked. Especially is this the case as regards the delirium, the weakness of the pulse, and the general debility. On or about the sixth day there is occasionally a fall of temperature; but it is a remission only, for the fever again steadily increases. There is a great tendency to bronchitis and pneumonia, due doubtless to the marked cardiac weakness. This state of things persists generally until the end of the second week of the illness. At this time, or a few days later, at all events during the third week, a sudden crisis arises. Profuse sweating or sharp diarrhoea, with sudden fall of temperature, ensues, and in a few hours an astonishing change for the better is apparent. The mind clears, the pulse becomes slower and stronger, the tongue cleans, and in a surprisingly short time the patient is convalescent. When death occurs it is generally at the end of the second or during the third week, and is due to extreme weakness or to the pulmonary complications which are such an important feature of the disease.

Most cases recover, but old age, previous alcoholic excess, and weak health are all unfavourable factors in forming a prognosis. Great debility, severe delirium or coma, and

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extreme feebleness of pulse, are all very grave signs. Phlebitis and parotitis have been observed as sequelæ.

There can be little doubt that typhus fever is due to a specific virus. It is a fever of poverty, dirt, and misery. Where there is chronic overcrowding, deficient ventilation and filth, there lurks typhus fever, or at least the conditions highly favourable to an outbreak of the disease. The contagion of the fever is rendered harmless by free dilution with fresh air. At the present time it is extremely rare to meet with typhus fever in London hospitals, though forty or fifty years ago it was frequently seen therein.

There is nothing special about the post-mortem appearances. As in all cases in which death has been preceded by high fever, the organs are soft, enlarged, and gorged with blood, of which the coagulation is but feeble.

Treatment.

From what has been said as to the nature of the disease, it will be readily understood that free ventilation, but without draughts, is one of the first necessities. The patient must, of course, be kept in bed, and special symptoms should be treated as they arise. He must be carefully and frequently fed with fluid nutritious aliments, such as beef-tea, broth, and milk; in most cases, especially those in which marked feebleness of pulse occurs, free stimulation will be required. Should delirium be severe, an ice cap to the head, Leiter's tubes, or tepid sponging may be used with advantage. Opium should not be employed to procure sleep, or only with the greatest circumspection, on account of the tendency to lung engorgement due to cardiac weakness. As in all fever cases, a constant watch must be kept on the bladder, and the catheter used if necessary. Particular care should also be taken to avoid the development of bed sores. Drugs are not usually required, but quinine may sometimes be useful.

PAROTITIS (MUMPS)

PAROTITIS, or mumps, is an infectious and contagious disease of which the chief symptom is great and rapid inflammatory swelling of the parotid, and occasionally of the submaxillary glands, accompanied with fever, and in some cases followed by metastatic inflammation of the testicle or mamma. As in other infectious fevers, there is a period of incubation. This period is characterised by its length; it is generally about twenty days, but may be considerably shorter; in some cases it has not been more than eight days.

The first symptom of invasion generally consists in a feeling of fulness and tightness at the side of the jaw, and on examination it is found that a swelling exists in this locality. The swelling occupies the depression between the mastoid process and the lower jaw, and it fills up this hollow. This swelling rapidly extends, and in a short time passes from behind the angle of the jaw to the side of the face and to the neck. The swelling also may extend upwards on the face towards the eyes. As a rule, the two sides of the face are affected consecutively, and in this way the swellings may meet under the chin, giving the patient a grotesque appearance, and causing a large temporary double chin. In some cases the patient's appearance is so greatly altered that he is hardly recognisable. The swelling may be confined to one parotid throughout, but much more usually both are affected; it is tender on pressure, but soft to the touch. The swelling causes much difficulty in swallowing and in mastication, and there may be severe pain in the ear, the latter in some cases being an early symptom and preceding the

Symptoms.

appearance of swelling. Fever may accompany the inflammation of the parotid gland, but is usually slight. In exceptional cases, however, high fever and delirium occur. After a day or two the swelling begins to subside, and then quickly disappears. Suppuration is extremely rare, but it does occur in very exceptional cases. The submaxillary gland may share in the inflammation of the parotids, but may also be affected alone. With the subsidence of the swelling the febrile symptoms and difficulty in swallowing vanish, and the patient becomes convalescent.

In many cases, however, the malady is not yet over. Quite suddenly, about a week after the commencement of the parotid gland enlargement, the patient complains of pain and swelling in one testicle. This proves on examination to be due to orchitis, often with effusion into the tunica albuginea, and may be accompanied with very high fever, great pain, and much delirium. After a few days, as a rule, the temperature again falls, the inflammation of the testicle clears up without permanent damage to the organ, and the patient is convalescent.

Unfortunately, there is a great tendency for orchitis following mumps to be followed by atrophy of the testicle, and this atrophy may set in very rapidly. In most cases of orchitis of this description one gland only is affected, but both may suffer; if this is the case, and atrophy ensue, incurable impotence will follow the inflammation. It is necessary to be aware that in some cases of mumps the swelling of the parotids may be so slight as to escape detection; nevertheless the temperature will be raised. In these cases, if orchitis follows, mistakes are apt to be made concerning the nature of the testicular inflammation. Errors are less likely to arise when the disease is epidemic; but in any case of orchitis, the cause of which is not obvious, it is well to bear in mind that mumps may have preceded its appearance. Children under adolescence are but little liable to this sequela of the disease. Those chiefly

attacked are youths at or about the age of puberty, and men. In other words, functional activity of the organ would seem to be an essential factor in the causation of the testicular affection. In females who have arrived at the age of puberty there would seem to be a similar, but far less marked, tendency to inflammation of the breast, and in some cases of the ovary, as the result of an attack of mumps. These cases are, however, rarely seen. In some instances deafness may follow an attack of mumps, and this form of deafness may be persistent and incurable.

Parotitis is an essentially contagious disease and often occurs in epidemics. Its natural history also gives the strongest support to the theory that the malady depends upon a specific virus. Many efforts have been made to isolate the morbid agency. Many micro-organisms have been found in the fluid derived from the affected glands, from the saliva, and from the inflamed testicle. Some of these organisms have been cultured, but none have been successful in inducing the disease when inoculated upon animals. It cannot, therefore, be said that satisfactory evidence exists as to the efficiency of any of these organisms in causing parotitis. It ought to be added, however, that most animals are insusceptible to the disease.

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As mumps is not a fatal disease, it is not possible to say anything very definite as to its morbid anatomy. In very rare cases patients have died of intercurrent maladies, and post-mortem examinations have been made. A condition of oedema of the connective tissue of the gland has been described, and it has been stated that the parotid itself has been unaffected as regards its secretory structures. It would be rash to attach much importance to such results, and for practical purposes the process affecting the glands may be regarded as one of inflammatory swelling, speedily resolving, and leading to no evil effects except in those rare cases in which suppuration occurs. It is con-

sidered by some that the morbid particle (if such exist) obtains access to the gland from the saliva through Steno's duct.

Treatment.

When the disease breaks out in a school or institution, those persons who have been exposed to infection should be isolated. As the period of incubation is so long, the isolation should be for at least three weeks. Isolation is the more necessary, not on account of the malady itself, which is often trivial, but from the serious results which may follow, viz., atrophy of the testicle and deafness. For these reasons it is a mistake to treat the disease lightly, and as of little or no consequence. During the febrile stage of the malady the patient should be kept in bed, and indeed should remain there until all danger of orchitis is passed, as it is certain that exertion at this stage tends to induce inflammation of the testicle. The diet should be fluid, on account of the difficulty in moving the jaw. The usual saline draughts may be prescribed, and the bowels must be kept open. Pain in the affected regions may be alleviated by warm fomentations, though in many cases application of a layer of cotton wool will be all that is necessary. In severe cases, with delirium, stimulants will probably be required; in most cases they are not needed. Orchitis must be treated with hot applications, and complete rest must be ensured.

INFLUENZA (LA GRIPPE)

THIS is a disease of which much has been heard in recent years. It has a great tendency to appear suddenly in epidemic form, and when its violence is exhausted it vanishes with similar rapidity, only to reappear in precisely the same manner in the course of some months, a year, or more. Many historical epidemics have occurred. One of great severity was in 1404, known as "le tac." If an incubation period exist, it is usually very short. It may be a few hours or a day or two.

The onset is abrupt; the patient complains suddenly of great prostration, violent headache, pain in the frontal sinuses, and loss of appetite. Shivering may occur, also fainting and weakness. The temperature rises rapidly, and may attain 104° or less. Rashes have been described, simulating those of scarlatina or measles. In some cases catarrhal symptoms are added to those already mentioned. In recent epidemics, however, these symptoms have nearly always been absent. Usually after a few days, during which the temperature has remained febrile, convalescence commences. It is in this convalescent state that one of the most serious complications of the malady, viz., pneumonia, arises. To old people especially this pneumonia is a very fatal development of the disease. In some cases the symptoms are chiefly abdominal; diarrhoea and dyspepsia are complained of. The duration of the uncomplicated disease is generally about a week, but the numerous complications may prolong the persistence of influenza to many weeks, or even months. Often more or less persistent debility follows the malady, and may be attended with an occasional rise in the evening

Symptoms.

temperature. Convalescence may be as long as three months before it is complete.

It is clear that many other diseases are likely to be mistaken for influenza. The student is particularly warned against the habit, far too prevalent, of attributing to "influenza" maladies which are quite alien to this complaint. We have seen the most outrageous mistakes of this description; even the desquamation of scarlatina has in our experience been ascribed to an attack of "influenza." When, as in the recent epidemics, influenza has become a fashionable malady and a subject of comment, often reckless, ignorant, and injudicious, in the daily press, it is not to be wondered at if the public, always credulous in matters of health, comes to regard every trifling ailment as an attack of this affection. To this tendency the medical profession should lend no countenance. Influenza should never be diagnosed unless every other possible cause of the symptoms has been excluded.

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The disease occurs in all climates, and attacks young and old, sound and feeble indiscriminately. In 1892 Pfeiffer isolated and described a bacillus, which is assumed by some to be the cause of the disease. It is found in the muco-purulent bronchial secretions. It appears that the bacilli are difficult to cultivate, and that they have a special preference for the hæmoglobin of the blood as a culture medium.

The post-mortem appearances are simply those of the complications of the disease, bronchitis and lobular pneumonia being the chief morbid conditions which are found. Fatal cases are chiefly old people and those in delicate health.

Treatment.

For this disease it is scarcely possible that effective measures of isolation can be adopted. But every effort should be made to prevent its spread by the most careful disinfection of the person, the clothes, bedding, etc. It is of great importance that the patient is put to bed and kept there until the acute symptoms have subsided. There can be no doubt that in many cases neglect of this precaution has led

to the development of pneumonia, which is such a serious complication of the malady. Nutritious food in the fluid form should be administered. There is some evidence that quinine is of value in the treatment of influenza. It may be given in the form of the ammoniated tincture of the B. P. There can be no doubt that the severe headache is often relieved by antipyrin, phenacetin, and drugs of the same class. Much caution should be used in their employment, which is not without danger. Dover's powder is a safe and valuable remedy. Change to sea air and careful feeding and clothing are necessary during convalescence.

PERTUSSIS, OR WHOOPING-COUGH

IN this malady an incubative period of indefinite duration precedes the onset of the characteristic symptoms. This period may be a week or ten days. Whooping-cough is an infectious and contagious disease in which sudden violent paroxysms of coughing occur, ending frequently, though not invariably, with a peculiar shrill, long-drawn inspiration, the characteristic whoop. The attacks ensue at frequent intervals, and are often followed by retching or vomiting.

Symptoms.

The onset of the disease is usually marked by symptoms of catarrh of the bronchial tubes, and it is only after the persistence of this catarrh for some days, or it may be for a week or two, that the really characteristic symptoms appear. When a paroxysm is imminent, the child—for the patient is usually a child—often seems conscious of what is about to happen. He may suddenly become still, or may run to his mother a few seconds before the attack commences. It consists of a series of violent expirations, with resulting venous congestion. The chest is practically emptied of air by these expiratory efforts, and at the end of the series the peculiar and characteristic inspiratory sound occurs, and is due to the passage of air through the partially closed glottis. The particular series of expiratory effort ends with the crowing inspiration. But the calm is deceptive. In most cases further series of paroxysms ensue, and may be repeated up to three or four. After this the attack ceases, and the child does not appear to be further affected. Thus each attack is made up of several paroxysms. In some cases, as already mentioned, the attack is followed by vomiting, and this symptom may

be so severe as to greatly compromise the prospect of recovery, the child dying from asthenia. In other cases hæmorrhage from the bronchi or lung substance may ensue, or the same may arise from the nose or pharynx. The violence of the paroxysms occasionally leads to the occurrence of hæmorrhage into the conjunctiva, or even into the eyelid; and prolapse of the rectum may be induced by the same cause. In severe cases there is a marked tendency to the production of emphysema of the lungs from the expiratory pressure. Ulceration of the frenum linguæ is occasionally observed. Pneumonia, generally of the lobular variety, is one of the serious complications of the disease. Convulsions are also a formidable complication of whooping-cough, but are seldom met with. A very rare but very grave accident is pneumothorax, due to the great expiratory effort. Vomiting, as already mentioned, may be a very dangerous complication. It is obvious that during the paroxysm there must be a serious strain upon the right side of the heart. It seems reasonable, therefore, to conclude that certain forms of heart failure may be due to the fact of the child suffering from pertussis. Possibly cases of cardiac failure, not explicable on other grounds, may originate in this manner. The number of attacks during twenty-four hours varies greatly. In mild cases there may be no more than six, eight, or ten; when, however, the malady is present in its severe form they may occur every hour, or even more often than this. Attacks are often brought on by excitement, or indeed by emotion of any kind. The illness generally lasts from a month to six weeks, but may be shorter or longer in its duration.

Whooping-cough is essentially a disease of childhood. It may be met with from the period of earliest infancy, but is most common from the third year to the seventh or eighth. A second attack is decidedly rare, and adults seldom suffer from the disease. The malady is dangerous in inverse proportion to the age of the patient, and in the case of very young children whooping-cough is a most serious affection.

There is a close connection between pertussis and measles. Very frequently an attack of measles is followed by one of whooping-cough, and sometimes the two affections occur together, a combination of much gravity as regards prognosis. Whooping-cough is practically always accompanied by enlargement of the bronchial glands, and not seldom this enlargement tends to become caseous. It is probably from these caseous foci that the infection of tuberculosis is transmitted, and this accounts for the strong tendency which exists to the development of tuberculosis consecutive to pertussis. This tendency is indeed one of the great dangers of the malady.

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Nothing definite is known as to the pathology of whooping-cough, and its morbid anatomy is simply that of its complications. Although no specific micro-organism has yet been discovered, all recent investigations point in the direction of the disease being caused by a microbe. The fact of the contagiousness of the malady, and of the attack being usually protective, is strongly in favour of this view. However this may be, there can be no doubt that the chief activity of the virus is spent on the nervous system.

The chief post-mortem findings are those characteristic of broncho-pneumonia, collapse of lung, emphysema, bronchitis, enlarged and caseous bronchial glands and tuberculosis.

Treatment.

As far as possible isolation should be practised, the patient being kept indoors and in rooms well ventilated, but free from draughts.

There is no real cure for this disease, and medicine has no more than a palliative influence. Drugs without number have been lauded in the treatment of whooping-cough, and all kinds of exaggerated claims have been made on their behalf. They may all be dismissed as being nearly useless. Perhaps the most highly recommended of all is belladonna, but practically it has no effect unless given in almost

poisonous doses. Further, any slight improvement which may occur is usually only temporary. Some writers recommend the administration of morphia. Its use requires care. Others speak well of inhalations of carbolic acid or other disinfectants. Good effects have occasionally followed the use of antipyrin, but its employment is not devoid of risk. The violence and frequency of the paroxysms may sometimes be controlled by the use of bromide of potash and of chloral, but these drugs have no effect in curtailing the course of the disease. Sometimes in late stages of the malady change of air to the seaside is beneficial.

The diet should be nutritious, but stimulants are not required. When, as is not infrequently the case, the attack ends in vomiting, the child should be fed immediately after the paroxysm is over. This will prevent the serious exhaustion and debility that may ensue from want of food. During the early catarrhal stage, the child should, as is referred to above, be kept indoors and treated for bronchitis. At a later stage and when catarrhal symptoms are absent, it is better for the patient to be out of doors as much as possible when the weather is fine. But if symptoms of bronchitis are present he should on no account leave the house. Free ventilation, without draughts, is necessary, and this at all stages of the malady. It is a good plan to rub the chest with some stimulating liniment, such as that of turpentine; and the inhalation of half per cent. carbolic acid vapour may also be recommended.

It should never be forgotten that whooping-cough is a serious disease, one not to be treated lightly, and that it is not to be considered in the nature of a complaint which a child is sure to have under any circumstances. The numerous and serious complications to which the disease is liable, and especially its extreme tendency to light up a tuberculosis, would alone prove the necessity of exerting every effort to avoid the exposure of a child to the risk of contracting the malady when epidemics of whooping-cough are prevalent.

DIPHThERIA

THIS is a highly contagious malady, in which severe membranous inflammation of the throat is accompanied with great prostration, with cardiac weakness, and with albuminuria, but in which fever is slight or absent.

Symptoms.

The symptoms of diphtheria vary greatly, both locally and generally. Some cases are so mild that unless a bacteriological examination be made it is impossible to say that the case is other than a slight tonsillitis or pharyngitis. On the other hand, the severity of the malady may be so great that the patient is cut off within a day or two of being taken ill, and the throat may in such a case be the seat of an abundant, foul-smelling diphtheritic membrane. In such conditions, to all intents and purposes, the patient dies of septicæmia. Between these limits all degrees of severity of symptoms are met with.

As a rule, the disease commences with some febrile disturbance, such as pain in the head and limbs, languor, and loss of appetite, and at the same time sore throat is complained of. In some cases the latter may be the very earliest symptom. On examining the throat greyish-white patches may be observed on the tonsils, pharynx, and more especially the uvula and soft palate. From a practical point of view the presence of these patches on the soft palate and uvula is very important, and a strong corroborative proof that the case is one of diphtheria. As time passes, the temperature, which at the outset may have been 102° or 103°, has a tendency to fall, and may be no more than 99° or 100°. This is a characteristic feature of the disease. Diphtheria is not a malady in which high

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fever plays a part; on the contrary, the temperature is often low throughout. The appearance of the patient is now that of a person who is seriously ill. He is very weak, has an indifferent expression, makes but little complaint, and desires to rest. The throat appearances are very characteristic; the membrane has usually increased, both in thickness and in extent, and the whole pharynx, tonsils, and soft palate may be covered with it. Its appearance is often suggestive of wash leather. Should the membrane be detached, a raw bleeding surface is left, on which it rapidly re-forms. The breath is often very fetid. The glands of the neck and angle of the jaw are very often swollen and tender. This last is an important sign, and should always be looked for. If the urine is examined, it will very frequently be found to be albuminous, and the presence of albumen is often a useful aid in forming a diagnosis. It is true that in tonsillitis or pharyngitis, with high fever, albumen may occur in the urine, but in such cases it is due merely to the temperature, and is not met with nearly so frequently as in diphtheria. We are disposed to think that albuminuria is one of the most constant physical signs of this disease, and that it is practically never absent at some period of its course. Certainly the extreme weakness and depression of the patient with albumen in the urine form perhaps the most characteristic features, along with low temperature, of the clinical aspects of this disease. In a very large proportion of cases the patient dies after the above symptoms have continued for a few days or a week, death being due to asthenia.

Such, then, is an ordinary case of diphtheria of the pharynx affecting an adult. There is, however, another very marked and definite type of the disease, seen chiefly in young children, in which the affection of the fauces is either absent or very slight, and in which the full virulence of the malady is directed against the larynx and air passages. In this form of the disease the first indication

of what is about to happen often occurs at night. The child may be put to bed, apparently in his usual health; after some hours he wakes up in great anxiety, owing to difficulty of breathing. A stridulous sound often accompanies inspiration, and he may struggle for some seconds before relief comes. The attack passes off, but the child remains restless and feverish. This condition continues next day, and the next night, or earlier, a similar attack, or attacks, may ensue. It is now seen that the child is very ill. His voice is hoarse, his breathing laboured and accompanied with a stridulous sound, and it is observed that the lower chest wall is drawn in on inspiration. The face becomes cyanosed, and if relief is not afforded convulsions and death from suffocation will ensue. Should life be prolonged, there is great risk of the supervention of lobular pneumonia, shown by rise of temperature, increasing dyspnoea, and the local physical signs of patchy consolidation. After the performance of tracheotomy on young children lobular pneumonia is particularly apt to ensue, and is one of the most usual accidents incident to this operation. When children under two are the victims of diphtheria it is practically always the laryngeal form of the malady which affects them, and such cases are most fatal. Tracheotomy at this age is hardly ever successful. In some cases this form of diphtheria may occur during the course of, or consecutive to, the specific fevers, such as measles or scarlatina. Such cases are nearly always those of the so-called "mixed infection," in which not only the Klebs-Löffler bacillus, but also staphylococci and streptococci are present. In another class of case, the disease, commencing in the pharynx, spreads to the glottis, thus invading the larynx and air passages, with the production of symptoms which have already been fully described.

In very rare cases the diphtheritic process has been known to spread down the oesophagus and attack the stomach, which thus becomes the seat of diphtheritic inflammation.

Diphtheria is not always confined to the pharynx and larynx. It may appear on any abraded cutaneous surface, and may also attack the genital organs. In such cases the throat or larynx may be implicated at the same time, or they may be free, the disease being cutaneous only. In any case the general symptoms are those already described, and the danger to life is equally great.

In some cases the nose may be the chief seat of the diphtheritic process. It may be affected alone, or more commonly in connection with diphtheria of the pharynx. In this case an offensive, thick, sometimes blood-stained discharge from the nose appears. If it occur apart from pharyngeal diphtheria it may be far from easy to diagnose this form of the affection. Nasal diphtheria is always attended with severe weakness and depression. When a condition of prostration, accompanied with a foul nasal discharge, is present, nasal diphtheria should always be thought of.

In any form of severe diphtheria sloughing and ulceration of the parts affected may occur, and severe hæmorrhage may ensue. In such cases symptoms of profound septicæmia do not long delay their appearance, and the death of the patient is certain.

When, in a case of diphtheria, amendment occurs, the membrane gradually disappears, it is detached and becomes disintegrated, no fresh membrane forming. The diseased surface rapidly heals and a new epithelial covering is formed, and in a short time assumes a healthy appearance. Strength is gradually regained, but convalescence is often long and tedious. Albumen disappears from the urine. But danger to life is by no means over, for sudden death often occurs when the patient would appear on the high road to complete recovery. This fatal termination in what would seem to be a state of convalescence is due to an attack of syncope. Apart from such an attack, prolonged cardiac weakness

is by no means uncommon. The pulse is often very weak, and may be intermittent or irregular for weeks after convalescence seems to be established.

Paralytic phenomena are of very frequent occurrence after diphtheria. They may appear while the disease is still acute, or may be postponed until three weeks or a month after the disappearance of the symptoms of the malady. By far the most frequent paralytic affection is that of the soft palate, shown by a nasal type of voice and by the return of fluids through the nose when drinking. Along with this form of paralysis, or appearing alone, is often weakness of accommodation. The patient complains that he cannot read or do any work requiring near vision, and examination of the eye will probably show that the accommodation is completely paralysed. Ptosis may be present, or paralysis of some muscle moving the eyeball. But the paralytic phenomena are by no means confined to single nerves. Paraplegia is not seldom met with, or the weakness may be hemiplegic, confined to one limb, or to a group of muscles. The knee-jerks are usually abolished at an early stage of the paralysis. Sometimes weakness, commencing in one limb, or as a hemiplegia, affects successively different groups of muscles, until there is extensive muscular paralysis. Should the respiratory muscles be involved great danger to life results, as if a slight attack of bronchitis supervenes, or even without it, the lungs may become engorged, and death from failure of respiration ensue. We have recently seen a case of this kind in a boy of fifteen in whom, in spite of every effort, the weakness extended from the legs to the muscles of the back, so that he was unable to sit up in bed. In a short time respiratory paralysis ensued, and proved fatal. In this case, as in many others resembling it, the attack of diphtheria passed unrecognised. It was of the mild, inoffensive type already referred to, and was considered by the friends to have been nothing more than a trivial sore throat. It is important to remember the fact that such mild attacks

may be followed by severe symptoms of paralysis and by sudden death from heart failure, which are by no means confined to the acute forms of the disease as sequelæ. In some cases after diphtheria the heart beats unduly fast, or on the other hand the pulse may be abnormally slow, or the two conditions may alternate.

The whole question of the causation of diphtheria is at present more or less *sub judice*. By many the disease is regarded as being due to the presence of a bacillus, first described and isolated by Klebs and Löffler, and which is known by the name of the Klebs-Löffler bacillus. To the "toxin" generated by the presence of this organism the disease is supposed to be due. The bacillus is a straight or slightly curved rod, thicker than the tubercle bacillus, but of the same length approximately. But its form is not by any means constant, presenting several varieties. It appears that this bacillus is invariably present in true diphtheria, and it occurs in such cases in the false membrane, which is a characteristic feature of the disease. But the microbe can be present before the formation of the false membrane, and can certainly propagate the disease to healthy persons at this period. Nevertheless, it appears that the stage in which false membrane is formed is that in which the risk of contagion is greatest. The Klebs-Löffler bacillus can certainly also exist long after the disappearance of false membrane. It has been found in the throat two months after the disappearance of all symptoms and signs of diphtheria. Further, at this late stage the bacillus may still be capable of propagating the disease. The bacillus can be cultivated, and can be inoculated on animals, with the production of a disease which appears to resemble diphtheria. This bacillus, then, may be said to invariably be present in cases of true diphtheria. But it is by no means the only micro-organism found in the diphtheritic false membrane. On the contrary, other microbes exist, notably the *staphylococcus pyogenes* and *aureus* and the *streptococcus pyogenes*; these latter cause associated sup-

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puration. There are many cases, to all appearance those of diphtheria, in which the Klebs-Löffler bacillus is absent, and instead of it ordinary staphylococci and streptococci are found. Such conditions are most frequently met with in scarlatina or other contagious fevers. They are described as cases of "streptococcus" infection. The local appearances are often exactly similar to those of malignant diphtheria, and there is a great liability to the development of septicæmia, from which the patient rapidly succumbs. In another class of case both streptococci and the Klebs-Löffler bacillus are met with together. These are cases of the so-called "mixed" infection. As already mentioned, it is customary to reserve the name "diphtheria" for those cases in which the Klebs-Löffler bacillus is present, whereas the others may be described as *diphtheroid* or *pseudo diphtheritic*. But the difficulty of determining the relationship between the Klebs-Löffler bacillus and diphtheria is by no means satisfactorily elucidated. Not only, as just mentioned, may the bacillus be found in the throats of patients months after they have suffered from the disease, but they are not seldom met with in the throats of persons who are in all respects perfectly healthy. It is clear from this that the bacilli are not under all circumstances and invariably the cause of the disease, but that sometimes they may be perfectly harmless inhabitants of the fauces. It is usual to say that the poison of the disease is a "toxin" elaborated by the bacillus; but if this is so, it is clear that certain special conditions are required for the production of this poison. The confident and dogmatic tone, too often adopted at the present day, with regard to the agency of bacteria in causing disease is nowhere more marked than in connection with the malady now under discussion, and is greatly to be deprecated. The student is specially warned against attaching too great importance to the rash and premature statements of the professional bacteriologist and physiological chemist on this subject.

The diphtheritic process is an inflammatory one, and

consists essentially in the production of a fibrinous network, the so-called "membrane" which covers the diseased surface. The diphtheritic false membrane differs from other "fibrinous" or "membranous" results of inflammation only by the presence in the former of the Klebs-Löffler bacillus. Thus the result of injury to the throat from the action of scalding water, or of strong corrosives, may be absolutely indistinguishable from that due to a diphtheritic inflammation, except in the one particular mentioned. In the milder cases, and in the earlier phases of the disease in the severe ones, the morbid process is limited to the upper surface of the mucous membrane affected, destruction of the epithelial layer alone ensuing. But in the more severe forms of this disease the whole thickness of the affected surface is involved, and the diphtheritic membrane extends down to the subjacent structures, the mucous membrane itself becoming necrotic. In grave cases severe ulceration may ensue, and violent hæmorrhage may result from the perforation of vessels. In severe cases of the disease septic absorption occurs from the diphtheritic surface, and the symptoms are those of septicæmia. The lesion affecting the kidney is indistinguishable from ordinary acute nephritis, and it would appear that the poison of diphtheria has the same tendency to excite acute renal inflammation that is so characteristic of the scarlatinal virus. The diphtheritic membrane, when affecting the trachea and bronchi, occurs as a dirty-greyish consistent layer on the mucous membrane, which can be peeled off in patches. The surface beneath is red, inflamed, and may be bleeding and raw, and the membrane rapidly re-forms. When the process extends to the pulmonary structures the usual appearances of lobular pneumonia are produced, together with extensive collapse of portions of the lung. It has been clearly proved that the nervous lesions, so frequently met with after diphtheria, are really due to peripheral neuritis.

There is very strong evidence that cats suffer from

diphtheria, and that the disease may from them be conveyed to human beings. Quite recently we have heard of a case of this kind in which a cat suffering from an offensive nasal discharge, after being petted by them, appears to have communicated diphtheria to a family of four children, two of whom died; in the membrane removed from the pharynx in these cases true Klebs-Löffler bacilli were found. The cat was killed, and was found to be suffering from a membranous inflammation of the mouth, nose, and fauces indistinguishable from diphtheria. Other animals also suffer from this disease, amongst which are cattle and pigs. We are indebted for particulars of the above case to Dr. J. Cater.

Treatment.

It is scarcely necessary to say that prophylactic measures are of the highest importance, the disease being eminently contagious and infectious. The patient should, of course, be isolated at the earliest possible moment. It is by no means easy, however, to secure this most necessary seclusion on the part of the sufferer. The disease often appears under the guise of slight tonsillitis or pharyngitis, and patients who do not consider themselves to be seriously ill will not consent to enforced isolation.

It has been suggested that all suspicious sore throats be submitted to examination, with the view of determining the bacteriology of the matter found on the surface of the mucous membrane, *i.e.*, should the Klebs-Löffler bacillus be found the case would, of course, be regarded as one of diphtheria. In many cases it is difficult or impossible to make a bacteriological examination, and even if the investigation can be undertaken, it may not be practicable to isolate the case during its progress. Still, it is well to act as far as possible on the lines here suggested.

The treatment of the disease by antitoxin is now a recognised procedure. The principle of the treatment lies in the fact that animals can be made immune to the disease by the injection under the skin of cultures of diphtheria bacilli, sufficiently diluted, and repeated a certain number of times.

At first a severe reaction results from the injection, but after repeated injections this becomes less, and at length a period arrives when the employment of the most virulent cultures is followed by negative results. It is now considered that if the blood serum of this immunised animal is injected hypodermically in the case of a human being, that a certain amount of immunity, which is, however, of no long duration, will ensue. Further, if the patient be already suffering from the disease, amendment of the symptoms is thought to follow. It is considered by some that, if employed sufficiently early in the disease, cure may be the result of the injection. This blood serum of the immunised horse is known as "antitoxin." It is, of course, collected with all precautions in tin-lined vessels, and the greatest care must be taken to avoid contamination by the syringe or skin of the serum about to be employed. The amount of antitoxin to be used is calculated in units, with reference to a certain standard. This standard is defined by Behring as being that quantity which will render inert a certain minimum of diphtheria virus. This "normal serum" forms a unit of antitoxin to the cubic centimeter. There is considerable difference of opinion as to the number of units of normal serum which should be employed. Much depends upon the age of the patient. Under two years of age 1000 units are often recommended for the first dose, and about 500 units in a less serious case. About two years the first injection may be about 2000 units, to be repeated within twenty-four hours if necessary. Enthusiastic supporters of antitoxin treatment claim that it causes the temperature to fall, detaches the false membranes, which come away and are not re-formed, and that the case generally assumes a far more favourable aspect. Further, it is asserted that the use of antitoxin often obviates the necessity of tracheotomy, which has hitherto been so often required in children under two years of age. It may be in some cases that such happy results ensue, but certainly in others nothing of the kind happens. Many of

the post-mortem examinations we have recently seen in cases of diphtheria are those in which antitoxin had been employed. It is freely admitted, even by those who speak most highly of the use of antitoxin, that it is of the utmost importance that the remedy be used early in the disease. In weighing the evidence on this subject, it must not be forgotten that in statistics many cases are included which are not diphtheria at all. Further, it is a well-known fact that, quite irrespective of all treatment, the mortality of the disease varies enormously. Considerations such as these should make us careful in attributing too much importance to the results of antitoxin treatment. It seems that the dangers attending the use of antitoxin are very slight, or nil. Certain rashes of erythematous nature have been described; local abscess at the seat of injection has occurred, and also sometimes albuminuria. But the latter is equally likely to have been the result of the disease itself. There can be no possible objection to the employment of antitoxin treatment, and some would go so far as to say that it would be highly improper to forego its use in any given case. There is no doubt that since the introduction of antitoxin tracheotomy has been less frequently required in the treatment of diphtheria, but whether this is due to the action of the remedy, or whether to a change in the character of the epidemics of late years, is not clear.

The general treatment in all cases of diphtheria is of great importance. Stimulants will be required, and nourishment should be administered at frequent intervals in concentrated form. Disinfectant washes and sprays may be applied to the seat of the disease, but all strong applications and caustics are better avoided. During convalescence much care will be required. Fatigue or sudden effort of any kind should be sedulously avoided, and internally strychnine may be useful.

ERYSIPELAS

ERYSIPELAS, as seen by the physician, generally affects the face, head, and neck. The period of incubation is uncertain ; it is usually four or five days.

The disease generally commences with a distinct rigor, Symptoms. and the temperature rises rapidly. It may attain 102°, 103°, or even higher figures. The usual febrile phenomena accompany this rise of temperature, *i.e.*, there is lassitude, headache, loss of appetite, pain in the limbs, and constipation. A local lesion may or may not be present. Very often there is none whatever, and in such cases it is possible that the virus of the disease has gained access to the system through some slight and trivial abrasion, which is too small to attract attention. Concurrently with, or soon after, the appearance of symptoms the local signs of the malady manifest themselves ; a portion of the skin, perhaps over the bridge of the nose or round an eye, becomes tender and painful, and is seen to be the seat of inflammatory redness and swelling. The colour is usually bright, but may be dark red or lurid, and temporary anæmia is induced by pressure with the finger ; the affected surface feels hot to the touch. The inflammation rapidly extends by the advance of a well-defined, slightly raised border, and sometimes a swelling of the cutaneous surface about to be affected precedes the appearance of redness. The inflammation is essentially fugitive, disappearing at one place and reappearing in its immediate neighbourhood. There is a great tendency to inflammatory œdema, and the affected skin and that adjacent to it may be so swollen that the features of the patient become more or less obliterated and his appearance nearly

unrecognisable, even by his intimate friends. He complains much of a sensation of burning and of a painful distension of the affected area. On the surface of the inflamed skin vesicles often appear. Their contents at first are usually clear, but soon become clouded, and in severe cases even purulent. Usually the vesicles dry up, forming crusts. The acute inflammation may spread with great rapidity, successively involving the forehead, the scalp, and the back of the neck. During all this time the constitutional symptoms persist, but in favourable cases tend to ameliorate with the arrest of inflammation; they finally disappear, the temperature becomes normal, and the patient is convalescent. Desquamation generally ensues over the surfaces which have been the seat of the erysipelatous process.

But in some cases of severe type the skin inflammation tends to spread both in area and in depth, suppuration may ensue in the affected region, and cellulitis supervenes. In such cases the temperature tends to rise to a still greater height, delirium and coma may appear, and the patient passes into a typhoid condition. In fact, all the symptoms of profound septic poisoning occur, and death is usually not long postponed.

In most cases the symptoms of the disease are comparatively mild, and after the expiration of a week or ten days the patient recovers. If the temperature ranges high, albuminuria may occur, but is of short duration only, disappearing with the febrile symptoms. Leucin and tyrosin have been detected in the urine, showing that these substances are not met with only in cases of acute yellow atrophy of the liver. A certain degree of leucocytosis is present in most cases of erysipelas, but no definite conclusion as to the gravity or possible duration of the malady can be drawn from the presence of this excess of leucocytes. The lymphatic glands in the neighbourhood of the inflamed area are enlarged, but may be difficult of detection, owing to the inflammatory swelling.

The complications of erysipelas are not numerous. Pneumonia may occur in severe cases, mostly in those showing symptoms of septicæmia. Meningitis is very seldom observed, and it is particularly important to be aware that cerebral symptoms in severe types of this disease are not the result of intracranial inflammation, but of the high fever. Ulcerative endocarditis may be met with in such a condition. The malady is, as a rule, very serious in those whose constitutions are broken down, and in the aged. Those, too, who have been addicted to over-indulgence in alcohol are very liable to succumb to an attack of the disease. The tendency to recurrence is very marked in this malady.

Particular care must be taken not to confound the cutaneous affection of erysipelas with that of other skin diseases. There is a special danger of erysipelas being described as eczema, and still greater danger of the contrary mistake. Over and over again we have seen acute eczema of the face and head described as "an attack of erysipelas." Careful examination will show in all cases of acute eczema the minute vesicle characteristic of this skin disease, which will be present at least on some portion of the affected surface, and can be often detected by the use of a lens when invisible to the naked eye. Further, the absence of marked febrile disturbance, of rigors, of great prostration, and the history of the case will all help in obviating mistakes.

It appears to have been clearly established that erysipelas is due to the invasion of the skin, through some slight breach of surface, by the *staphylococcus pyogenes*, the micro-organism which is associated with most forms of suppuration. This growth consists of numerous cocci, which are not motile, and circular in outline. They are arranged in chains, due to the tendency of the cocci to divide transversely. They grow on various nutrient media, of which bouillon or solidified blood serum seems to be the most suitable. It is possible that the symptoms

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of fever which characterise erysipelas are due to some form of toxin produced by this micro-organism. In the majority of cases of erysipelas seen by the physician no breach of surface can be detected, but it is nevertheless extremely probable that it is only by a solution of continuity of the cutaneous investment that the microbe obtains access to the human system. Doubtless the abrasion is too small to be detected. It may be, too, that in some cases the disease originates in the mucous membrane of the nose, and gains access to the adjacent skin from this starting-point.

Erysipelas is a dermatitis, and presents the characters of ordinary inflammation. The morbid appearance will, of course, vary with the intensity of the inflammatory process. When complications occur they present no special feature, and are in the nature of lesions associated with septicæmia and pyæmia.

Treatment.

Erysipelas is not a disease which shows itself amenable to drug treatment. In all cases the patient should be isolated, and every endeavour made to avoid the spread of the infection. In hospitals the complaint should be treated in separate wards served by a special staff, both of medical attendants and nurses.

Most cases of this disease get well of themselves, the malady running its natural course in a few days in spite of all treatment. All kinds of internal remedies have been suggested. At one time it was thought that large doses of perchloride of iron were very useful. We have never seen good results follow this mode of treatment; on the contrary, much stomach disorder and nausea have been caused by the administration of this remedy when the fever has been high. Symptoms must be treated as they arise. Local means have been highly praised. Flexile collodion has been painted over the inflamed surface with a view of limiting the morbid process, and nitrate of silver has been employed with the same object; neither of these measures is attended with marked success. Recently it has been

recommended to inject a two per cent. solution of carbolic acid at the healthy margin of the advancing inflammation. The application of ichthyol in ointment, or in oil, to the affected surface has been employed with good results in restraining the inflammatory redness and in limiting the progress of the disease.

Probably all that is necessary in ordinary cases is to cover the inflamed surface with antiseptic powders, such as one composed of equal parts of boracic acid and starch. In many cases stimulants will be required, and in all nutritious food must be administered in easily assimilable form. The use of Marmorek's anti-streptococcic serum in this disease has not led to any very definite results.

SEPTICÆMIA AND PYÆMIA

THE consideration of the subjects included under the above heading is often relegated to surgical works. Septicæmia and pyæmia are, however, by no means confined to surgical practice, and it is very important for the student to have a thorough knowledge of the symptoms of these affections. These symptoms are, in a few words, high fever, rigors, sweating, and great prostration.

Symptoms.

Septicæmia and pyæmia often commence suddenly with a severe rigor, accompanied with rapid elevation of the temperature. The thermometer may register 103°, 104°, or higher temperatures, and very frequently marked morning remissions and evening exacerbations are present. Profuse sweating is very usually observed, and from the first appearance of symptoms the patient is extremely prostrate. The pulse is very rapid, and often markedly compressible. Enlargement of the spleen is generally observed, and a tendency to embolism and thrombosis is not seldom present. Rigors may continue during the progress of the case, accompanying the periodical rise of temperature, and thus giving rise, in conjunction with the splenic enlargement, to a resemblance to ague. There is frequently a tendency to inflammation of the endocardium, and this form of endocarditis is by no means limited, as is that due to acute rheumatism, to the left side of the heart; on the contrary, the right side is quite as frequently affected, and in some cases is alone involved. Such valvular lesions are often accompanied with the production of large and rough, easily detachable vegetations, which explains the tendency to embolism, already referred to as being so frequently present in

septic conditions. Not seldom, too, ulceration of valves similar to that met with in ulcerative endocarditis (itself a septicæmia) ensues. It is, of course, obvious when valve lesions arise in the course of septicæmia that murmurs will develop, varying in point of maximum intensity and in quality according to the valve affected and the nature of the lesion, whether obstructive or regurgitant. Not infrequently eruptions are present in this malady; they may be erythematous, but are in some cases of hæmorrhagic nature. Troublesome vomiting may be present, and most severe and intractable diarrhœa, with very offensive evacuations, is not unusually a prominent symptom; peritonitis may also occur. A form of pneumonia, which creeps on insidiously and does not show itself by marked physical signs, is of usual occurrence. When this complication ensues the prostration of the patient becomes still more marked, as does the weakness and rapidity of the pulse; the alæ nasi move during respiration, and the face assumes a dusky or even cyanotic tint.

Nervous symptoms and tremor of the muscles are often observed in septicæmia, and low muttering delirium may be associated with a markedly typhoid state.

Mild cases of septicæmia generally recover, but even in the most favourable conditions convalescence from the disease is often very long and tedious, and it may be months before the health is completely re-established. In the severe forms of the malady death may be due to exhaustion, but is frequently the result of the pulmonary complications to which reference has been made. Death is frequently preceded by the development of a typically typhoid condition in which the patient lies low in bed, with marked tremor of the voluntary muscles, quite unconscious, and with a dry, brown tongue and sordes on the teeth. Muttering delirium is often present, and the contents of the bladder and rectum are passed involuntarily.

Severe cases may terminate fatally in a few days; on

the other hand, the disease may persist in a more or less chronic form for weeks or even a few months.

In pyæmia, to the symptoms above described are added those due to the formation of pus in various organs and localities, of which the joints are perhaps most frequently affected. When the internal organs, such as the liver, are the seat of abscess formation, it may not be at all easy to locate the site of the accumulation of pus, and in all cases in which, without obvious cause, symptoms of pyæmia or septicæmia arise it is well to bear in mind an observation of the late Dr. J. S. Bristowe, recorded in his "*Theory and Practice of Medicine*." Speaking of septicæmia and the determination of its cause, he remarks that, when the latter is not obvious, he has found it a good rule to pass the hand over the surface of each limb. If such a proceeding be adopted, the whole complex of symptoms will not infrequently be explained by the presence of swelling and tenderness on the osseous surface due to bone disease or to periostitis. It must not be forgotten, too, that the severity of the symptoms of septicæmia and pyæmia may be by no means in relation with the apparent gravity of the local lesion. We have seen a case in which most threatening symptoms, dry tongue, a temperature of nearly 104° , and rigors were due to what appeared to be a trifling injury to a finger joint—so trifling, indeed, was the local affection in the first instance that the patient only incidentally alluded to its presence.

In pyæmia due to a wound or injury of any kind the symptoms of the disease may be preceded by an unhealthy appearance of the local lesion; in such cases the discharge may become foul or may cease entirely. Lymphangitis, shown by the presence of bright red lines traversing the skin above the seat of injury, may ensue, and then the lymphatic glands to which the inflamed vessels lead will rapidly become swollen, tender, and possibly the seat of suppuration.

Acute pyæmia is a very serious malady, generally ending fatally within a few days, but in the chronic form of

the disease, as in chronic septicæmia, life may be prolonged even for months. In such cases the patient gradually wastes and gets progressively weaker, being, in fact, worn out by the hectic fever characteristic of the malady.

In medical practice septicæmia and pyæmia are seen most frequently in ulcerative endocarditis, in empyema which is not freely drained, in abscess of the liver or of other internal organs, and more especially in middle ear disease and consecutive cerebral abscess. We emphasise the connection between otitis media and symptoms of septicæmia, on account of the association of the two affections being not seldom overlooked or forgotten. We recall a case in which the symptoms recorded in this article were present in a woman of nearly sixty. A discharge from the left ear of nearly twenty years' duration gave the only obtainable clue as to the nature of the case. Post-mortem examination showed necrosis of the petrous portion of the left temporal bone, together with plugging of the lateral sinus from thrombosis. Thus the possibility of ear disease being present in these conditions should never be lost sight of, and in doubtful cases a most careful examination with the aural speculum should be made.

Both in septicæmia and pyæmia there can be little doubt that the malady is due to the absorption into the system of a specific and definite poison. Whether the latter is a micro-organism pure and simple, or the result of the activity of a micro-organism—in other words, a toxin or ptomaine—is not material in the practical sense. There can be no doubt that the extreme virulence of the poison is spent upon the blood, and this fluid undergoes most serious changes as the result of the activity of the evil influence, whereby the bodily functions are most gravely compromised; further, this deleterious action ensues on the introduction of a very minute portion of the poison into the blood stream. It would seem, therefore, that the poison must multiply within the system. But not in all cases, or invariably, are septic injuries, using the term

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in its widest sense, followed by symptoms of septicæmia. Clearly, therefore, the presence of some other factor is necessary in order that the poison may develop its activity. Probably this other factor is the state of the general health. When this is in any way feeble or broken, then it is, in all probability, that the conditions are present for the production of the symptoms of septicæmia. Thus it is possible that the pus-forming organisms, the *streptococcus pyogenes* and *aureus* may attack a patient when he is in an enfeebled, and therefore vulnerable, condition. Presumably from the development of toxins or ptomaines, the affection of the throat, known as "streptococcus diphtheria" may arise, or some other malady in which the symptoms of septicæmia are well marked.

Other causes of the disease are operative, and especially, post-mortem, wounds; it is remarkable in such cases how very slight the initial injury may be; often it is a mere graze or scratch.

The conditions giving rise to pyæmia in medical practice have been already alluded to. There is a special liability after parturition both to septicæmia and pyæmia, which is easily understood when the large surface open to the reception of micro-organisms is borne in mind.

The most important post-mortem appearances in septicæmia are those affecting the blood. This fluid is often very dark in colour, unduly liquid, and is frequently extravasated either in the form of petechiæ or of hæmorrhages into cavities or organs. There is a pronounced tendency to blood staining, which is especially obvious in the heart and vessels. The valves of the heart may be the seat of inflammation, with marked production of granulations, or even of ulceration, and the valves of the right side are often affected as well as those of the left. The intestinal tract may be the seat of acute catarrhal changes. The various organs are enlarged, and often very soft; they may contain numerous infarcts, due to embolism or thrombosis; these are often specially numerous in the lungs. Edema of

the latter organs is invariably present, as are frequently aberrant forms of lobular pneumonia, especially marked in the lower lobes.

In pyæmia the different organs may be the seat of numerous abscesses, which are present together with the above-mentioned changes affecting the body generally.

In both septicæmia and pyæmia the greatest efforts must be made to maintain the strength of the patient, and for this purpose the most nutritious and easily assimilable food must be administered. Stimulants will also be urgently required. It must never be forgotten that the maladies are intensely adynamic, and that no reducing treatment of any kind must be thought of. Quinine may be administered if considered desirable, but it does not usually cause any improvement in the general condition; and the temperature, if temporarily lowered by its administration, almost always quickly regains its former, or even a higher, level. The serum treatment of septicæmia and pyæmia has not given brilliant results, and must at present be regarded as a failure. Treatment.

In pyæmia the surgical treatment of the local lesion or lesions is of the first importance. Empyema, or liver abscess, must be freely opened and thoroughly drained. Unfortunately in medical practice, owing to the uncertainty of the diagnosis, the inaccessible situation of the collection of pus, and to the fact that the pyæmic abscesses are frequently multiple, it is very often quite impossible to adopt surgical measures, and in that case all that can be done is to support the strength of the patient and to relieve his sufferings as far as possible. When a wound exists it must, of course, be most carefully cleaned and disinfected.

CEREBRO-SPINAL FEVER

Symptoms. THIS malady commences more or less abruptly. The first indications of illness are complaints of languor, with severe headache and pains in the limbs. A well-marked rigor may occur. Very soon fever sets in, and the temperature may rise to 103° or 104° . Severe nervous disturbance is now a prominent symptom; the patient is delirious, and in some cases maniacal. There is well-marked rigidity of the neck, a characteristic symptom, and in some cases contraction of the limbs is present. An early incident in the disease is the appearance of a rash. This may be erythematous, or it may be herpetic; other varieties of rash have been described, but the two mentioned have been the most frequently met with. By the third or fourth day all the symptoms are fully developed. There is great prostration, and as a rule the sphincters are paralysed, and the use of the catheter becomes necessary. An early symptom is rigidity of the neck, already alluded to, with retraction of the head; and in severe cases rigidity of the whole back, and even opisthotonos, has been observed. Paralysis of the cranial nerves is not uncommon, particularly of the third and seventh; convulsions may occur, but are not often present. In addition to the rashes already alluded to, petechial lesions may also appear, giving rise to the term "spotted fever." Most cases end fatally within a week of the onset of the illness. Should recovery ensue, sequelæ often remain in the form of mental weakness, blindness, deafness, or mutism. In severe cases death may be due to coma.

Not all cases run the acute course described above. In many the disease assumes a milder form, and recovery

takes place; but too often with the abiding deformities to which reference has just been made. In these milder cases delirium may be replaced by indifference, or by sulky, sullen demeanour.

As an aid to the diagnosis of this disease, and in meningitis generally, it is necessary to give a short account of Kernig's sign. This consists in the difficulty experienced in straightening the knees when the patient is placed in the sitting posture. It is generally found that in this position the knees are bent, and the inability to straighten them forms the sign in question. But too much reliance must not be placed on this as an evidence of the presence of cerebro-spinal meningitis. In many cases the sign is not present, and it may be recognised in other forms of meningitis, such as the tubercular. The mortality in this disease varies greatly in different epidemics; it has been as high as 80 per cent.

Cerebro-spinal meningitis is epidemic, contagious, and infectious. Recent researches have rendered it probable that it might be caused by a micro-organism, the *diplococcus intra-cellularis* of Weichselbaum. A micro-organism resembling the pneumococcus is also found in cases of cerebro-spinal meningitis. Opinions differ as to the part played by this coccus in causing the disease, some regarding it as being a *vera causa*, while others would reject it, favouring the claims of Weichselbaum's diplococcus as being the causative agent. But much further observation and experiment are required before an authoritative statement can be made on this matter. It is suggested that the organism enters the cranial cavity by the lymphatics, being taken in by the mouth or nose. Epidemic cerebro-spinal meningitis is very rarely seen in this country, but is occasionally met with in America. It occurs at all ages, and in both sexes, but young people appear to be more exposed to its ravages than their seniors.

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The morbid appearances resemble those observed in simple meningitis of the brain and cord.

Treatment.

This consists in sustaining the strength of the patient by suitable feeding and stimulants, and in dealing with symptoms as they arise. The pain in the head and delirium are often relieved by an ice cap. It may be necessary to administer morphia hypodermically. Most cases end fatally in spite of all treatment.

MALARIAL FEVER

Two chief types of fever are described, intermittent and remittent. Nothing certain is known with regard to the incubative period of malarial fever, except that its duration varies very widely, being shorter in the remittent than in the intermittent form.

Intermittent fever, or ague, is characterised by Symptoms. attacks of fever occurring at regular intervals, which are separated from one another by periods of complete apyrexia. Very frequently for a day or two before the attack the patient complains of feelings of lassitude, of disinclination for exertion, and of slight feverishness. Apart from these premonitory symptoms, the attack of ague commences suddenly. It is divided into three stages, the first, or cold stage, the second, or hot stage, and the third, or sweating stage. During the cold stage the temperature rises rapidly, and may attain 104° , 105° , or even a higher grade. The patient complains of feeling very cold, he shivers, and the skin of his extremities is often blue. The duration of this stage varies considerably; it may last an hour or two. In the second stage the shivering and feelings of cold give place to those of agreeable warmth, which, however, soon pass into a sensation of most uncomfortable heat. The skin becomes dry, and feels very hot to the touch. The patient is thirsty, and the high fever may be accompanied by delirium. The temperature maintains its elevation. This stage may last for several hours. The spleen enlarges during the attack, and may be felt below the costal arch. When repeated attacks of malarial fever occur the organ may be chronically enlarged, and this increase of size may

persist long after the liability to paroxysms of the fever has passed away. The hot stage is followed by the final manifestation of the activity of the disease, viz., by the sweating stage. The temperature now rapidly falls, and attains the normal. There is profuse sweating, and the patient, feeling cool and comfortable, often falls into a deep sleep. The attack ends with the close of this stage, and the patient is generally well on its termination. The duration of the sweating stage varies considerably. During the period of freedom from attack, or that of intermission, the patient may be in fair or even in good health, but is often weak and anæmic.

Several divisions of the fever are defined, which are founded on the length of the intermission. The chief varieties are the quotidian form of the malady, in which an attack occurs once in every twenty-four hours; the tertian, when the attack returns every other day; and the quartan, in which the ague appears on every fourth day only. The quotidian is the most severe type of the malady, the tertian the least so.

Remittent fever is almost entirely confined to the tropics. In it the temperature during the intervals between the attacks does not fall to the normal; it still remains febrile, though lower than during the actual existence of the attack. This form of fever is altogether more severe and more serious than the intermittent variety. The symptoms are marked by imperfect development of the cold stage, which is also of short duration; by a very prolonged and severe febrile stage, and by an ill-marked, slightly developed sweating stage, which may, indeed, be altogether absent. The febrile stage is often characterised by delirium, and even by coma. Typhoid symptoms may also develop. With slight intervals of remission these attacks may persist for a fortnight, or less, and at the end of the series profuse sweating may occur. But sometimes the remittent gives way to the intermittent form of the malady.

Malarial fevers are met with in this country practically

only in the persons of those individuals, soldiers and others, who have lived in the tropics and who have suffered from the fever there. Such patients are often sallow and emaciated. On any slight exposure to chill they are liable to a return of the malarial fever, which, generally after the lapse of a few days or a week, leaves them probably in their usual health. It must be added that certain fenny districts in Great Britain and Ireland constitute an exception to the rule enunciated above, as cases of intermittent fever do certainly occur in such localities, the eastern counties for example, from time to time. It may be asserted that in London hospital practice malarial fever is never seen except under the circumstances alluded to above. Mistakes in diagnosis are not seldom made, and the fever of ulcerative endocarditis, for example, may be wrongly ascribed to an attack of malaria.

As is well known, malarial fever is met with in tropical and sub-tropical countries almost universally. Wherever there are marshy, swampy localities, there malarial fever is rampant in those countries in which it is observed. And in direct proportion to the success which attends efforts at drainage and cultivation does the virulence of malarial fever disappear. It is clear, therefore, that a close connection exists between the condition of the soil and climate and the occurrence of malarial fever. For years it has been thought that the specific cause of the disease must be some definite organism, and recent researches go far to establish the truth of this view of the origin of the malady. A parasite has been detected in the blood of those suffering from malarial fever, which is thought to be the efficient agency in producing the disease. Just before the cold stage the patient's blood is found to contain, but in certain corpuscles only, a pigmented disc of living material. Later, and as the shivering begins, the protoplasm of this pigmented disc breaks up into small round particles, and at the same time the pigment undergoes aggregation. The result of all this is that the blood

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corpuscle perishes, and the spherical bodies are dispersed in the blood stream. Some of these bodies gain access to red blood corpuscles, of which they consume the hæmoglobin, and form ultimately the pigmented disc, which is really the malarial parasite. It appears, too, that numbers of the spherical bodies are destroyed by the leucocytes by a process of phagocytosis. The researches of Dr. Manson and of Major Ross render it very probable that mosquitoes have much to do with the transmission of malarial fever. It is thought that the microbe of the disease is carried by the mosquito, and by it introduced into the blood of the victim. The subject is an extremely interesting one, but is at present *sub judice*, and further discussion of the matter would be out of place in these pages.

Treatment.

In tropical countries stringent hygienic precautions are necessary, and should always be taken. Especially is this the case in those climates which are known to be malarial. The resident in these regions should avoid drinking the unboiled and unfiltered water of the district, should not be out after sunset or in the early morning, or if he is compelled to leave the house at these times, should always be served with hot tea or coffee before starting. The ground floor should be avoided in selecting a sleeping apartment. Great moderation is required in the use of stimulants, and very often their employment is best altogether discarded.

In quinine we appear to possess a specific agent for the cure of malarial fever. Opinions differ as to the manner in which the drug should be taken. A good plan would seem to be that of administering a large dose immediately before a paroxysm is due. Often, however, the drug acts well when taken in divided doses three or four times a day. The amount consumed in twenty-four hours may vary from ten to twenty or thirty grains. It is very doubtful if the huge single doses occasionally administered are really required, or of benefit. Opium may be necessary to check restlessness and to procure sleep. Cold or tepid sponging is often grateful to the patient during the hot

stage. The marked tendency to anæmia caused by the disease must be met by the administration of iron, arsenic, and quinine. The patient should, of course, quit the malarial region as soon as possible, and not return to it if he can avoid doing so.

CHOLERA ASIATICA

THERE is an incubative period of uncertain duration in this disease; it is often only a few hours, but may be as long as five days. As a rule, symptoms are absent during this period, but towards the end of the prodromal stage there may be attacks of abdominal pain, with looseness of bowels, failing appetite, and feelings of *malaise*.

Symptoms.

It is generally possible to distinguish three stages in the clinical manifestations of cholera. The first stage is that of promonitory diarrhoea. In most cases this comes on quite suddenly, but in those in whom symptoms of abdominal disturbance have attended the later days of the prodromal stage the diarrhoea which has troubled them becomes more marked. In all cases there is abdominal pain and griping, and in some vomiting also occurs. This stage rapidly passes into the next, or that of collapse. The diarrhoea, which has hitherto been of more or less bilious character, with distinctly faecal evacuations, now changes its nature. Bile disappears from the motions, which are no longer of faecal appearance. They are very abundant, watery in character, and of a greyish-white colour. This appearance is striking, and has been described as resembling that of water in which rice has been washed, the so-called "rice-water" evacuations. They may be frothy, and may rarely contain small quantities of blood. The motions may contain flocculi and granular matter. This rice water material is albuminous, and consists largely of the serum of the blood. The reaction is alkaline, and the fluid swarms with bacteria, of which the comma bacillus is the most important. The passage of this material may attain great intensity—to such an extent, indeed, that the

body of the patient is almost drained of fluid. Accompanying the diarrhœa are most characteristic symptoms of collapse. The patient falls into a condition of profound prostration; his skin becomes cold, and the temperature of the surface actually falls, it may be considerably below the normal. At the same time, a thermometer in the rectum may reveal a temperature of 103°, or higher. The face becomes drawn and pinched, and the eyes are surrounded with dark circles. The pulse becomes rapid, excessively weak, and may, indeed, be imperceptible at the wrist. Vomiting is urgent, and the vomited matters present the same appearance as those passed by the bowels. The urine is albuminous, and is often very scanty, or is even suppressed. A very severe symptom is that of cramp. This is chiefly complained of in the legs, but may affect the muscles of the trunk and upper extremities. These cramps come on in paroxysms, and cause the patient great suffering. The voice becomes weak, hoarse, or husky, and great thirst is complained of; all these symptoms tend to increase, and too often the patient passes into a comatose condition, death speedily ensuing. Should he survive, he passes into the third stage of the malady, or that of reaction. In this stage the diarrhœa tends to become less and finally ceases, as also do the vomiting and the cramps in the limbs; the quantity of urine increases, but it is still albuminous, and may contain casts. The skin gets warmer, and not seldom a rash presents itself, which is often erythematous. The pulse gets stronger. But the danger is not over, for it is by no means unusual for the favourable symptoms to be interrupted by a relapse, in which the collapse and diarrhœa quickly return, and in which the patient dies. And in some cases he passes into a condition known as "cholera typhoid," in which a typhoid stage ensues, with dry tongue, great prostration, and delirium, and which often terminates fatally. In favourable cases reaction once more sets in, the abdominal pain disappears, all symptoms cease, and the patient recovers.

The course of convalescence may be interrupted by a variety of complications. Acute nephritis may arise, and a tendency to diphtheritic inflammation of the large intestine is sometimes observed. Pleurisy and pneumonia may carry off the patient, and in some cases abscesses form in various parts of the body.

The severity of the disease varies enormously in different epidemics, in different localities, and as affecting different patients. The disease may be present in a comparatively mild form. Under these circumstances premonitory diarrhœa occurs, together with slight tendency to cramps and to collapse. In such cases the evacuations may not be characteristic, being often of fæcal appearance throughout. Recovery may ensue in a week or ten days. Most cases of cholera are of the typical form already fully described, but there are others characterised by such severity that the symptoms, as it were, have not time to develop. The so-called *cholera sicca* is a type of this extremely violent form of the disease. Without diarrhœa, the patient is suddenly struck down, and promptly dies. In other cases the stage of collapse is extremely well marked, and the patient dies in this condition without any reaction setting in. It will be seen that, in its mildest form, Asiatic cholera bears a marked resemblance to the diarrhœa, accompanied with severe collapse—so-called *cholera nostras*—of large cities during hot summer weather. The resemblance of symptoms may be so close that without a bacteriological examination it may be impossible to differentiate between these maladies. In some cases of poisoning, again, when arsenic or ptomaines have been swallowed, symptoms may arise markedly resembling those of Asiatic cholera. The history of the case will, of course, be of the first importance in making the diagnosis.

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Cholera is a contagious disease, though not in the sense of being communicated from one person to another by mere contact. It is seldom caught from direct attendance

on those suffering from it unless by contact with articles that have been used by the patient, his bed or body linen, or food vessels. The disease is undoubtedly transmitted by means of the patient's evacuations. Linen soiled by the alvine discharges, or by the vomit, is in a high degree dangerous in this respect, and for this reason washerwomen and others concerned with the cleansing of the bed and other linen are greatly exposed to risk of cholera infection. All this, of course, points strongly in the direction of cholera being due to a specific organism, and there can be no doubt that the so-called comma bacillus of Koch is the organism in question. This is not in reality a bacillus, but a spirillum, provided with a single flagellum. It is actively motile, about half the size of the tubercle bacillus, but broader than it, and is curved or bowed, giving rise to the resemblance from which it takes its name. This spirillum grows easily on many kinds of media, and it flourishes also upon various articles of diet; it is thus easy to understand that the disease may be conveyed by the food. When injected into animals symptoms of severe collapse, with fall of temperature, ensue, and intestinal symptoms similar to those of the developed disease also follow.

There can be no doubt that the spread of cholera is due to contamination of the water supply. The disease is essentially a water-borne one, though other factors co-operate. Of these geographical situation and individual temperament both play an important part. A certain temperature favours the occurrence of cholera epidemics, and unless a certain average temperature is maintained all the year round it would seem that the disease cannot permanently take root. Thus the malady is never entirely absent in India, though at certain seasons only does it assume epidemic proportions. Other causes, such as moisture, height of locality above sea level, etc., also bear relationship to the prevalence of the disease. Individual predisposition is an important element, and a debilitating disease, diarrhoea, or alcoholism

renders a patient far more likely to fall a victim to the malady. It is needless to say that neglect of hygienic measures is a potent factor in favouring the outbreak of the disease. In India the contamination of the water in tanks is a most important cause of cholera. In a valuable paper on "Local Self-Government, Government Control, and the Calcutta Municipal Bill," by Mr. A. J. Hughes, C.I.E., the cause of the prevalence of the malady in Calcutta is most clearly brought out. The cholera death-rate in the suburbs of this city is no less than 5·8 per 1000. Now in the suburbs the tank system is very prevalent, and foul water is deliberately drained into it. These tanks are used by the people for performing their ablutions and for washing their household utensils. Under such conditions it is not to be wondered at that cholera is endemic in large Indian cities. There can be no doubt that, were it possible to secure really hygienic conditions, cholera might be stamped out even in India. How far we are at present from the realisation of such a desirable state of affairs is, however, only too obvious from a perusal of the paper by Mr. A. J. Hughes already referred to in connection with the water-tank system. Nothing but a thorough and most radical change in local administration of the great Indian cities, on the lines laid down in Mr. Hughes' paper, is likely to be of any service. At present, unfortunately, to anticipate that any such measures will be adopted would be apparently to take an Utopian view of the situation.

There are no post-mortem appearances absolutely characteristic of cholera. The body is shrunken, and rigor mortis sets in early, and is very well marked. Post-mortem movements from this cause are not infrequent. The organs generally are small, shrunken, apparently drained of fluid, and the spleen is generally markedly diminished in size; the intestines are filled with a characteristic rice-water fluid, which contains not only comma bacilli in enormous numbers, but also shed epithelium. Considerable difference

of opinion exists as to the origin of this epithelium, but it is generally regarded as being due to post-mortem changes. The intestinal mucous membrane is often found to be swollen, but pale; the blood is thick and dark. Such are the appearances when the patient dies in a state of collapse; when death occurs later, in the stage of reaction, the organs may present a hyperæmic appearance. The mortality from this disease is very high. It varies greatly in different epidemics, but is not seldom 50 per cent. of those attacked.

It need scarcely be said, in view of our knowledge of the cause and mode of propagation of cholera, that prophylaxis is of the utmost importance in preventing the outbreak and ravages of the disease. The most rigid supervision is required to enforce observance of rules. All evacuations must be disinfected, and then destroyed by burial with quicklime. The greatest care must be taken that the water supply does not become contaminated by the discharges. No water should be drunk that has not been previously boiled, and unripe fruit should not be eaten. Any case of diarrhœa should receive immediate treatment, and for this purpose notification of all such cases should be rigorously enforced. The treatment of the premonitory diarrhœa is of great importance. When this diarrhœa commences the patient should be at once put to bed and be kept warm; counter irritation by means of poultices to the epigastrium is advisable, and he should not be pressed to take much food. Milk in divided doses is all that is required. For the thirst, nothing is better than small pieces of ice taken into the mouth.

Treatment.

Great differences of opinion exist as to the drug treatment of epidemic cholera. Some authorities recommend treatment by purgation, through the administration of small doses of calomel; others regard the antiseptic treatment by salol, etc., as being the most successful; some, again, pin their faith to the use of opium. Against the latter mode of treatment it has been urged that it interferes

with Nature's efforts to evacuate the poison by purging and vomiting, and is therefore bad. It is a question whether any method of drug treatment has much real influence on the disease, and none of the above methods seem to have been successful except in those cases which would, in all probability, have recovered without any drug treatment whatever. Brilliant results have appeared to follow the intravenous injection of saline fluid in the stage of collapse. Unfortunately, such good results do not last, and it is frequently found that patients in whose case such treatment has seemed most successful for a time have shortly afterwards died comatose, or from exhaustion. Under all modes of treatment the mortality of Asiatic cholera is very high, being frequently, as already mentioned, 50 per cent., or even higher. It has been suggested that protection might be obtained by inoculation with the virus of the disease; this procedure has been extensively carried out by Haffkine. It is yet too early for the expression of positive opinion on the nature of the results obtained.

PLAGUE

THE incubative period of plague appears in most cases to be under a week, and seems never to be more than ten days. As a rule, no symptoms are observed during this period, but in rare cases some lassitude and loss of appetite have been complained of. Of more importance is the complaint sometimes made of tenderness in the neck, the armpit, or the groin, a symptom when present of much significance, as anticipating the appearance of the characteristic bubo.

The invasion of the disease is sudden, with symptoms of high fever. There is, however, nothing characteristic about these symptoms, and at this period it may not be possible, in the absence of the epidemic prevalence of the disease, to state positively what malady is under observation. The day after invasion, or later, the symptoms which confirm the diagnosis appear. They are those due to the development of the plague bubo. This is most often seen in the groin, but may occur in the neck or in the axilla. The swelling is due to inflammation of the lymphatic glands in the localities specified. The glandular enlargement is hard, and its increase in size is very rapid. Should the disease run a favourable course, the swelling gradually disappears, but suppuration not seldom occurs. During the maturation of the bubo the fever continues, and there is much prostration. When suppuration takes place, it usually commences at the end of the first week, and is often prolonged, the patient frequently dying of exhaustion. But more commonly death occurs during the development of the local swelling, and within the first three or four days of the appearance of symptoms. Much delirium and very

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high fever are often met with, and the patient may die comatose. In some cases a necrotic process attacks the bubo, and sloughing ensues. Carbuncles sometimes occur. This carbuncular inflammation may be situated on any part of the body, and the lesion may be single or multiple.

It is obvious that it is impossible to diagnose the plague with certainty in its early stages. At least this is so unless an epidemic is raging, or unless the tenderness and pain already referred to are complained of in those regions which are the seat of the characteristic bubo. In most cases the diagnosis must remain in abeyance until the bubo or carbuncle significant of the disease appears.

Another type of the disease, and a most deadly one, is that in which the symptoms resemble those of septicæmia; or, again, symptoms of pneumonia may arise. In both these forms of the malady there may be a tendency for the lymphatic glands to become swollen and tender, but in many cases no affection of these structures is noticed. Instances have been described with symptoms of inflammation of the tonsil; these glands and those of the neck became greatly swollen, with resulting danger to life from asphyxia. Other cases, again, have been recorded in which the symptoms were gastro-intestinal, much resembling those of enteric fever. A tendency to hæmorrhage gave the mediæval name of "black death" to this fatal disease. The hæmorrhage may take place from the lungs or the bowels, or, again, extravasation of blood may ensue into the skin, in the form of marked petechiæ. It will thus be seen that there are several leading types in the symptomatology of this deadly malady. The bubonic form of plague is undoubtedly the most common, comprising from 80 to 90 per cent. of all cases. The mortality of the disease is excessive; in many epidemics it amounts to 80 per cent. of the cases attacked.

Until recently the specific virus of the plague had not been satisfactorily isolated. Certain micro-organisms have been described, and have been supposed to be the

efficient agency in causing the disease, but until quite lately no definite knowledge on the subject existed. Kitatsato has now brought forward evidence in favour of the bacillus which he has discovered being the real cause of plague. This bacillus is found in the blood, and in the buboes of patients suffering from the disease. The bacillus has likewise been cultivated on solidified serum, and pure cultures have thus been obtained. It is rod-shaped, and the ends of the rod are rounded. When pure cultures have been inoculated on certain animals, symptoms of plague have been observed to follow the inoculation. All animals are not equally susceptible to the influence of these organisms. Rats, mice, and monkeys are eminently sensitive; on the contrary, cattle, sheep, pigs, and the domestic animals generally show but a low degree of vulnerability to the specific poison of plague. So marked is the sensitiveness of rats to the influence of the bacillus that a marked mortality of these rodents has not seldom heralded an outbreak of the disease, as has been frequently observed during the present epidemic in India. The bacillus is speedily killed by fresh air, by sunlight, by dryness of atmosphere. It flourishes only in connection with moisture, darkness, and filth. The disease is eminently contagious, but the contagion is almost entirely dependent upon the defective hygienic conditions which surround the patient. Thus the disease may spread in the most rapid manner amongst those who live crowded together in filthy surroundings, whereas their attendants, medical and other, who are Europeans, and whose hygienic arrangements are altogether satisfactory, seldom or never contract the complaint. Articles of clothing, furniture, and bedding are particularly apt to convey the infection, and it is important to remember in this connection that the bacilli are abundantly present in the expectoration, urine, and fæces of plague patients. This mode of conveyance was clearly the efficient cause of the outbreak which occurred at Eyam in Derbyshire in 1665, well known on

account of the heroism of Mompesson, the vicar of the parish. In this case the epidemic was clearly caused by the transmission of some clothes sent from London, where the plague was raging. It may be repeated that the disease is always most virulent in the presence of dirt, squalor, misery, and bad hygiene generally. It is, in fact, *par excellence*, a filth disease. It is on this account that in some Eastern countries the plague is more or less endemic, and for the same reason it has been found almost impossible to stamp it out in India, on account of the abominably filthy conditions in which the native inhabitants of the poorer quarters of the great cities live, and their invincible repugnance to having their houses put in hygienic order.

The post-mortem appearances are not characteristic, except as regards the presence of buboes. These are found to consist of enlarged softened lymphatic glands, which contain numbers of the characteristic bacilli. Rigor mortis is slow in setting in. The changes in the organs generally are those met with when death has been preceded by high fever. Petechiæ and larger extravasations into the skin have been described in the epidemics of the Middle Ages, but recent outbreaks have not manifested this tendency to cutaneous hæmorrhage.

Treatment.

From what has been said above, it will be obvious that hygienic measures and isolation are of supreme importance in preventing the spread of this deadly disease. As long as filth, squalor, and starvation are in evidence it is impossible to suppress the ravages of this scourge; in certain parts of the East it is always present, and can never be stamped out until the necessary hygienic reforms have been effected. Rigid disinfection of the body with solutions of carbolic acid, or one in a thousand perchloride of mercury, and disinfection, or, still better, destruction of body linen and bedding which have been in contact with cases of plague, is of the first importance, and bodies dead of this disease must always be carefully disinfected before burial. Quarantine may be necessary.

Symptoms only can be treated; there is no cure for the disease. Stimulants are often necessary; an excessive temperature may be combated with tepid or cold sponging. The diet must be abundant and nutritious. Some authorities recommend the treatment of the buboes by early opening. At the present time much thought and study are being devoted to the serum treatment of plague with the view of producing immunity. Haffkine has advocated the inoculation of a culture of the microbe which has been rendered innocuous by exposure to a certain temperature. It is yet too early to say anything authoritative on the results thus obtained, much further experience being required before it is possible to pronounce definitely on the value of this mode of treatment; but many competent observers are not favourably impressed by the results so far recorded.

YELLOW FEVER

IN this malady high fever is associated with jaundice and with a characteristic reddening of the conjunctiva, sometimes with a tendency to hæmorrhage. This fever is constantly present in South America and the West Indies, and from time to time assumes epidemic proportions. The black races are but little liable to be attacked, and when this happens the disease takes on a mild form. It seems that one attack protects the patient from liability to again suffer from the fever. The incubation stage of yellow fever varies considerably in duration. In some cases the invasion of the disease has ensued a few hours only after exposure to infection, while in others six, seven, or even nine days have elapsed before the first symptoms have manifested themselves.

Symptoms.

The invasion is often sudden, when rapid rise of temperature, often to 103° or 104° , occurs, and is frequently accompanied with a marked rigor. Should the onset be more gradual, feelings of discomfort, pain in the limbs, loss of appetite, and headache may precede the rise of temperature. An important symptom is irritation of the conjunctiva, which becomes markedly red and injected. Vomiting is often a severe and distressing symptom, and may be accompanied with much abdominal hardness and distension. After persisting for a day or two these symptoms often amend; the fever vanishes, the vomiting ceases, and the patient may consider himself convalescent. But just as so often happens in relapsing fever, the apparent improvement is of brief duration. In a short time the fever returns, and may attain its former height, and, in addition, marked jaundice develops. It is

this complication which gives its name to the malady. The injection and irritation of the conjunctiva continues, and, as can be readily understood, the contrast of yellow and red tint in the eyes gives a very remarkable and very characteristic appearance. The vomiting and pain in the epigastrium are well marked, and in severe cases hæmatemesis, the so-called "black vomit," now sets in. But hæmorrhage from other organs may occur, or extravasation into the skin may ensue in the form of petechiæ. In these deadly forms of the malady the patient passes into a typhoid condition, lying more or less unconscious, often muttering in his delirium. The urine may be albuminous throughout, and this is practically always the case when the temperature is high. But hæmaturia may also become a marked feature of the case. The patient often dies soon after the onset of the typhoid stage of the disease, but death may in such circumstances be delayed for a day or two. In some cases marked nervous symptoms arise, the patient becoming extremely delirious, and dying of collapse or in a comatose condition. It has been already mentioned that before the appearance of jaundice a period of amendment sets in. It may be in some cases that the fall of temperature at this stage of the malady is permanent, and the patient recovers, no jaundice appearing. But in all those cases in which hæmorrhage ensues the danger to life is great, and it is equally so when nervous symptoms are severe, and form a predominating feature of the clinical history.

Different epidemics of yellow fever show great variations of the death rate. Some are of so mild a character that nearly all those attacked recover, while in others "black" vomiting and collapse are constantly present and prove fatal, the mortality being alarming.

By some, yellow fever has been regarded as remittent fever, in which jaundice has arisen as a complication. There can, however, be little question that the two maladies are really quite distinct.

Causation
and Morbid
Anatomy.

There can be no doubt that, as in all other diseases of infectious type, a specific virus is at work in the case of yellow fever. It has, however, not yet been isolated, and it is, therefore, impossible to say in what it consists. It is certainly the case that, unless a high temperature is maintained, the virus of the disease cannot exist; for this reason yellow fever is endemic only in those regions whose range of temperature fulfils the necessary conditions. As in other diseases of the same class, defective hygiene, dirt, and bad ventilation strongly favour the development and persistence of yellow fever.

The post-mortem appearances in this disease are by no means characteristic. They are those observed in maladies, the course of which is accompanied by the development of a high temperature. Thus the liver may be enlarged and fatty, and the size of the spleen may be considerably increased. Hæmorrhages may be found in the stomach, intestines, or other organs.

Treatment.

Lowering measures, such as venesection and purgation, are inadmissible; otherwise the treatment must be conducted on general principles. The diet must be light and nutritious, the patient being kept in bed. Vomiting is often a serious symptom, and one difficult to treat. Small pieces of ice may be sucked, and the usual remedies adopted. No drug treatment appears to be of special use; but if remittent fever complicates the disease, as is sometimes the case, quinine may be advantageously administered. The patient must be isolated, and every endeavour made to prevent the spread of the malady. Hygienic precautions are of the utmost importance, and every effort should be made to procure good ventilation and the destruction of all filth. Disinfection of ships and dwellings in which yellow fever has broken out, or in which the disease has been treated, is urgently required.

DENGUE

THIS is an infectious fever characterised by the occurrence of severe joint pains, giving rise to the expression "break-bone fever," which occurs in tropical countries. It has prevailed in America, and was known in that country, and also in Cairo, during the last century, when a very good description was given of the symptoms of the disease. It diffuses with great rapidity, large numbers of people being simultaneously affected, bearing in this respect, as in certain of its symptoms, a striking resemblance to the epidemics of influenza which have been so much in evidence in recent years. The stage of incubation is often two or three days, but may be a week.

The symptoms of the disease appear suddenly, with chills and the usual febrile phenomena. The temperature may rise to a considerable height, 103°, 104°, or even higher, but the most remarkable feature of the malady is the tendency for the patient to complain of acute and severe pains in the bones and joints. In addition, severe pain in the lumbar region may occur, and also in the head and neck; the affected joints, too, are often swollen and tender, as are also the lymphatic glands. Rashes are of common occurrence, and are of various descriptions; but nothing special or characteristic can be described under this head. The rash is often erythematous, resembling that of scarlatina. In a day or two the febrile symptoms subside; the disease is not, however, over, for the temperature, after one or two days, rises, and the previous symptoms, including the pains in the bones, reappear. The whole attack may last a week or a fortnight, when the temperature again becomes normal, and the malady is at an end. But some

Symptoms.

time may elapse before health is restored, the patient complaining for long periods of pain in the back, head, and limbs. Most cases of this disease make a satisfactory recovery in the long run, and death very seldom occurs.

Causation
and Morbid
Anatomy.

As in all other diseases of the same class, there is every reason to believe that the cause is a micro-organism, but nothing certain is known as to its nature. Nothing can be said concerning the morbid anatomy of the malady, as death rarely ensues.

Treatment.

There is no specific for this fever; symptoms must be treated as they arise. Quinine is often ordered, and opium or morphia may be necessary in order to relieve pain. Undue elevation of temperature may be treated with the application of cold to the head, or by cool baths and wet packing. Much care is required during convalescence, when quinine and tonics may be of considerable use.

RELAPSING FEVER, OR FAMINE FEVER

THE period of incubation of this disease varies considerably. It is generally from three to six or seven days, but not uncommonly is much shorter. In some cases the symptoms appear immediately after exposure to infection.

The disease commences suddenly without prodromal symptoms. The patient complains of feeling chilly, and a marked rigor may ensue. At the same time the temperature rises, and the usual febrile symptoms develop. There is often a marked tendency to sweating; the temperature may rise to 103° , 104° , or 105° , and the pulse is correspondingly accelerated. This condition of things lasts usually until about the fifth or seventh day, when, quite suddenly, the temperature falls by crisis to the normal, or below it, and profuse sweating or diarrhœa generally occurs. This is the period usually described, but incorrectly, as that of remission. It is more often an intermission, and the patient is apt to regard himself as well. He is, however, mistaken, for after a few days a relapse generally occurs, in which all the previous symptoms reappear, but in a less severe form. At the end of three or four days the relapse terminates, and the patient is usually convalescent. But this is not always the case, and a third, or even a fourth, relapse may occur, each attack, however, being milder than the preceding one. It should be noticed that there is no eruption at any period of the fever. Convalescence is frequently long and tedious.

A marked feature of the disease is the tendency to severe pains in the muscles. These are present throughout its course in the legs and back; they may also be continued into the period of convalescence, and may persist during the remission. Complications are rare, but pneumonia

sometimes occurs, and hæmaturia has been occasionally observed. Pregnant women suffering from this fever nearly always abort, but are not themselves in special danger. The child is either born dead or dies soon after birth. The rate of mortality is low. Patients nearly always recover.

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There can be little doubt that the disease is due to a special virus. A spirillum may be seen moving in the blood during the febrile stage. This organism was first described by Obermeier, and is now usually regarded as being the active cause of the disease. During the apyrexial period no spirilla are observed, but bodies supposed to be spores have been seen in the blood during this period. Nothing definite is known as to the life history of the organism. Relapsing fever is especially prevalent where filth, poverty, and overcrowding are rampant. From this tendency to arise in conditions of poverty and squalor it is sometimes known as "famine fever." The malady is highly contagious, and apparently one attack does not protect from a liability to subsequent attacks. Relapsing fever occurs at all ages and in both sexes. The diagnosis in this fever can usually be made without difficulty, but in doubtful cases the presence of the spirillum in the blood during the febrile stage is characteristic.

Treatment.

Beyond the usual measures observed in all fever cases, no special treatment is required. There is no specific for the cure of relapsing fever. Quinine does not appear to have any effect in controlling the course of the malady. Should much prostration, or symptoms of collapse, accompany the crisis, stimulants may be required.

BERI-BERI

THE duration of the incubative stage in this disease is not certainly known. It appears, however, to be prolonged, extending even to months.

The symptoms of beri-beri consist essentially in Symptoms. the rapid development of weakness of gait, together with anæsthesia and paræsthesia. Frequently, too, dropsy is present, and palpitation of the heart and dyspnœa are often complained of. Certain symptoms characterise different forms of the malady; several groups have thus been defined, according to the nature of the chief clinical manifestations of the disease. In many cases the symptoms described above are ushered in with chills and *malaise*; and after continuing for some weeks or months, pass away entirely, but with liability to recurrence. In others œdema is a marked feature, and soon becomes the most prominent symptom, affecting, as it does, the whole body. Sometimes marked wasting of the weakened muscles supervenes; this may be so severe as to paralyse the patient, and the arms are affected as well as the legs. Again, very acute cases occur in which heart weakness may lead to the death of the patient, the latter ensuing in a day or two, or not until after the lapse of some weeks. In all these different varieties the early symptoms are more or less those of the malady when appearing in the form first described, and in all the different symptoms are more or less blended. In the milder cases the mortality is not great, but in the cardiac form the disease is very fatal. Different epidemics vary much in severity.

There is much difference of opinion as to the mode of Causation
origin of this disease. Many think that it is due to the and Morbid
Anatomy.

agency of a specific bacillus, which has not, however, yet been identified. Others look upon beri-beri as being the direct result of the ingestion of certain articles of diet, especially of raw fish and of unshelled rice. The latter theory derives much support from the experience of the disease obtained in connection with the Japanese navy. Striking results followed the prohibition of suspected articles of diet and the substitution of wholesome food. Other predisposing causes of the disease are defective hygiene and overcrowding. This malady, also known as "kakke," appears to be essentially a neuritis. It occurs in China, Japan, and in the Malay Archipelago, and in other hot countries. It has been met with also in Australia. In those countries in which the disease is endemic it is apt from time to time to assume epidemic proportions, with very heavy mortality.

The morbid appearances affect the peripheral nerves, and are similar to those met with in peripheral neuritis. Further, in atrophic cases there is marked wasting and degeneration of the muscular fibres in the limbs affected. The heart muscle is also degenerate in those cases which are characterised by cardiac symptoms.

Treatment.

Of the first importance is the prevention of the disease by suitable hygiene and dietetic reforms. Raw fish and unshelled rice should, more especially, be forbidden, and a wholesome, nutritious, and abundant dietary substituted. Overcrowding must be particularly avoided. No drug appears to influence the disease, but salicylates have been recommended. Symptoms must be treated as they arise.

LEPROSY

THIS disease is endemic in many different countries, being extremely rife in the Sandwich Islands. It is met with also in certain parts of the United States, in the West Indies, and in a few localities in Europe. Although terribly rife in the Middle Ages, cases of leprosy are never now seen in Great Britain unless introduced from other countries.

Clinically, two chief forms of this disease can be defined, the *tubercular* and the *anæsthetic*. Tubercular leprosy affects especially the face, the elbows, forearms, and hands, but other regions are also involved. The disease in its earliest form shows itself by the development of patches which are red in colour, often pigmented, and which present alterations of sensibility, being either hyperæsthetic or anæsthetic. The pigmentation, as a rule, does not appear until after the lapse of some time, and it may itself vanish, the patch finally assuming a greyish-white or white aspect. The characteristic leprosy granulomatous deposit takes place in these patches, leading at first merely to a thickening and roughening of the surface. Soon, however, ulceration occurs, and much scarring. The result is extreme destruction and distortion of the surface involved; to such an extent, indeed, does the process extend that, as regards the face, the most hideous deformity may ensue. The destructive process attacks the nose, mouth, and ears, and the eyes themselves do not escape the ravages of the disease. The thickening and distortion of the face may lead to the production of that form of deformity known as *leontiasis*. The mucous membranes are not spared; the disease may extend from

Symptoms.

the lips to the mouth, and then to the larynx, with the result that death may ensue from laryngeal obstruction.

The anæsthetic form of leprosy presents a very different clinical picture. In this type of the disease the earliest complaint is of some abnormal sensation, numbness, tingling, burning, or actual pain in the course or area of distribution of nerves. In addition, there may be considerable hyperæsthesia or anæsthesia of the cutaneous surfaces affected. Trophic changes are of common occurrence. Eruptions of herpes or of pemphigus may appear without apparent cause, and pigmentary changes are frequently observed, especially the formation of maculæ, the surface of which is often remarkably anæsthetic. Bullæ continue to be developed, and often form raw surfaces, which are slow to heal, or which break down altogether, with extensive necrosis of the tissues affected by them. In this way the fingers and toes may drop off. Contractions also occur leading to much distortion, and in some cases the limbs become practically hide-bound. The process is essentially a chronic one, and the lesions may persist for years before attaining their full development, but with gradually increasing deformity. If the nerves affected are accessible to examination, as, *e.g.*, the ulnar or peroneal, they may be felt to be thickened and roughened by the new deposit. In practice it is found that the two varieties of the disease, the tubercular and the anæsthetic, are more or less combined in the same case.

There would appear to be a definite connection between leprosy and tuberculosis, internal lesions being developed in leprosy at a later stage of the disease, which are indistinguishable from those due to the ravages of the tubercle bacillus. In other words, there seems to be a marked tendency for the victims of leprosy to be also attacked by tuberculosis.

It seems to be established that leprosy is to a certain extent due to the agency of a special micro-organism, the *lepra* bacillus, though other organisms are also clearly at

work. The lepra bacillus is found abundantly in the characteristic lesions. It bears a striking resemblance to the tubercle bacillus, but differs from it in the much greater abundance with which it is found in the lesions peculiar to leprosy, and also in the great difficulty, or impossibility, of cultivating it on any kind of nutritive medium. For this reason it is not possible to verify the agency of the bacillus in causing leprosy according to the rules formulated by Koch. The bacillus has been inoculated on animals, but without any definite result, and in one case on a criminal. The latter developed leprosy in the most characteristic form, but only after some years; and inasmuch as he was a native of Hawaii, where leprosy is endemic, it follows that no definite conclusions can be drawn from the positive results which followed inoculation.

Leprosy was formerly thought to be a hereditary disease, and it cannot be asserted positively that this is not the case. But the fact of the disease never being present, in any form, at birth, or indeed until some years afterwards, is against the view of the malady being transmitted from father to son. There can be little doubt that the malady is contagious, under circumstances where the contact of diseased and healthy is prolonged, and of the most intimate nature. Except under such conditions, the affection is certainly not capable of being communicated, as is shown by the fact of the immunity both of medical attendants and of nurses in institutions devoted to the care of the victims of leprosy. Whether diet may have any influence in causing the disease is quite uncertain, and no real support can be given to the view that leprosy is due to the consumption of fish.

The special lesions in leprosy are made up of a granulomatous tissue, bearing a striking resemblance to that of tubercle. The growth is composed of lymphoid cells, of leucocytes, and of blood-vessels, the whole being associated with a new growth of fibroid tissue, which tends to the

formation of cicatrices. The vessels are more numerous than in tubercular lesions, and hence there is not the same tendency to caseous changes and softening as is observed in the newly-formed tissue of the latter. Characteristic leprosy bacilli are found in large numbers between the cells, and also within them. In the anæsthetic form the new granulomatous growths are developed especially around the nerves, causing peri-neuritis and neuritis, to which the trophic changes so characteristic of this form of the malady are owing.

Treatment.

There is no cure for this disease. All that can be done is to palliate the patient's sufferings, and to treat symptoms and complications. In all cases isolation should be strictly enjoined. Certain oils, of which chaulmoogra oil and gurjun oil are the best known, have been applied locally, and also used internally. When this treatment was first announced brilliant results were claimed for it; but increased experience has not substantiated the permanence of these "recoveries." In all cases relapses have occurred, and it has been found that the use of cocoa-nut oil and caustic applications is attended with quite as good results as those claimed for the drugs in question. Doubtless any improvement observed has been due to the friction of the affected surface, and the consequent stimulation of the cutaneous functions.

All kinds of drugs have been recommended, and tried more or less successfully in this disease. Good results of temporary nature have followed the administration of arsenic. In no case, however, under any treatment, has the tendency to the further development of the malady been arrested. It has been noticed that the progress of leprosy has been sometimes delayed by the onset of an attack of a specific fever, such as variola. Acting on the hint, cases have been inoculated with cultures of the *streptococcus pyogenes*. No good result appears to have been obtained. In all cases hygienic measures are of

the greatest importance, and it is most necessary for the patient to have plenty of fresh air and a nutritious and abundant diet.

YAWS—FRAMBOESIA

THE affection to which the term yaws is applied consists in attacks of fever, followed by peculiar cutaneous symptoms, which may be of mild type or may lead to much ulcerative destruction of the skin and underlying tissues. It seems to be clearly established that protection against subsequent attacks is not conferred by the fact of the patient having already been the victim of the malady.

Symptoms.

This disease, which is confined to tropical countries, has an incubative period of variable duration, being on the average, perhaps, from about ten to fourteen days, but often much longer. During this stage no symptoms are usually observed, or if so, they are merely those of slight febrile disturbance. Accompanying the onset of the malady are joint pains and trifling elevation of temperature, but such symptoms are in no sense typical, being met with in many other morbid conditions. In exceptional instances the fever is much more severe; rigors may occur, and the temperature may rise to 104° , or higher. The fever may last only a few days, or may be prolonged for some weeks. The characteristic rash occurs in two varieties, which are, however, nothing more than different stages of one and the same lesion. The first appearance of the rash is in the form of somewhat raised patches, white in colour, and forming papules; in process of time some of these papules develop into what is really the characteristic lesion of the disease, the "yaw." This is a new growth made up of granulomatous tissue bearing a fancied resemblance to a raspberry, hence the name of frambœsia (*framboise*). When fully developed, these tumours are raised above the surface, and are covered with yellowish crusts. They vary

in size, and may occupy any part of the cutaneous surface, but they are common on the face, round the arms, in the popliteal space, and on the feet. They are not usually at all painful, but they give off very frequently a most offensive odour. The rash generally first appears at the time of subsidence of the febrile symptoms, and, as a rule, in the course of a few weeks, in otherwise healthy patients, these "yaws" tumours tend to disappear, leaving no trace of their presence beyond a deep pigmentation of the affected skin. In those, however, who are from any cause broken down in health, the growths tend to ulcerate, and in the case of syphilitic subjects the destruction of tissue may not remain limited to the local lesion, but may be very extensive, and attended with much constitutional disturbance. Yaws is a disease the duration of which varies greatly. As already mentioned, mild cases subside spontaneously in a few weeks or months. On the other hand, the malady, especially when complicated with tuberculosis or syphilis, may persist in a chronic condition for years.

Yaws is generally regarded as being caused by a specific organism which gains access to the system through an abrasion of the cutaneous surface. A micro-coccus has been discovered which some authorities look upon as being the specific agency, but nothing definite appears to be established as regards this question. The disease is certainly contagious.

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The characteristic lesion, the yaws tumour, shows the usual structure found in granulation tissue growths. It appears that suppuration does not occur in the tumour unless the latter is subject to irritation. The ulcerative lesions in this disease present nothing characteristic, being indistinguishable from those of syphilis. Indeed, considerable difference of opinion exists in these cases regarding the nature of such destructive lesion, some observers being disposed to look upon the whole process as

essentially syphilitic in character, and as being entirely disassociated from the other malady.

Treatment.

But little remains to be said under this head. It appears to be generally agreed that local treatment, beyond attention to cleanliness and ensuring healthy action of the skin, is more likely to lead to harm than to good. Further, most cases tend to recovery naturally. Any constitutional taint such as syphilis, should, of course, be treated, and in all cases efforts should be made to prevent irritation of the affected parts, with a view of avoiding ulceration. Numerous drugs have been employed in this malady, but, as might have been anticipated, none are of definite value. In all cases the general health should be attended to, and good diet and healthy surroundings are therefore of great importance in the treatment of the disease.

ACUTE TUBERCULOSIS

IN acute tuberculosis, a rapid and general development of miliary tubercle takes place. Nearly every organ and structure in the body may be involved, but clinically those most prominently affected are the lungs, the brain, and the peritoneum. It is difficult to explain the development in so short a space of time of the myriads of lesions found in this disease, except on the hypothesis of blood infection. As a result of this infection, the circulating fluid is laden with immense numbers of infecting agents, possibly the tubercle bacillus. This organism, being deposited in the tissue, may set up inflammatory changes, the nature of which depends upon the histology of the tissue. As tubercles may be made up of a variety of elementary structures, this hypothesis is certainly attractive.

In many cases of acute tuberculosis, though by no means in all, an area of caseation exists somewhere in the body. This caseating process may be present in a bronchial, an abdominal, or a cervical gland; or the process may arise in connection with chronic phthisis, and certainly in not a few cases of phthisis the fatal event is due to acute tuberculosis, which may undoubtedly arise in connection with the chronic pulmonary disease.

It is generally supposed that the tubercle bacillus which exists in such numbers in the products of caseating masses attains access to the blood and lymph streams, and in this manner becomes responsible for the development of the tubercular lesion.

The invasion of acute tuberculosis is generally somewhat abrupt. It may attack those who to all appearance have been previously in perfect health, or, Symptoms.

again, it sometimes occurs in conditions of ill-health not well defined. As an intercurrent lesion of phthisis, it has already been referred to. The symptoms are mainly febrile. The patient is noticed to be hot at night, and the temperature undergoes a nocturnal elevation it may be to 103° or higher. There are morning remissions of temperature, and the presence of night sweats shows that the fever is of distinctly hectic type. The patient wastes rapidly; he probably has a troublesome cough, with or without expectoration. The rate of breathing is increased, and cyanosis is a prominent physical sign. The latter is indeed one of the most characteristic features of the disease, especially when associated with marked acceleration of breathing, and should always, if present, be allowed due weight in forming a diagnosis. The course of the disease is very rapid, and in a few weeks from the commencement the patient may be so reduced that he cannot leave his bed. Sometimes profuse diarrhoea supervenes, or severe hæmoptysis. In most cases the disease, which is always fatal, ends by asthenia; but death may ensue from the causes just alluded to.

The physical signs must be sought for chiefly in the chest. They are not characteristic, being often merely those of bronchitis; the tubercles not being closely aggregated in the pulmonary structure, and being evenly distributed, do not cause dulness on percussion or increase of vocal resonance. Rhonchus, sibilus, and the different varieties of crepitation, of which the consonating is often observed, are the sounds audible on auscultation. When these physical signs are united with fever of hectic type, with sweating, with acceleration of breathing, and with cyanosis, the diagnosis is almost certain. But in some cases the physical signs may be those of pleuropneumonia, or of pleurisy only. The appearance of such physical signs in a case presenting the features of tubercular disease elsewhere—for example, tubercular peritonitis—is particularly suggestive of generalised and

acute tuberculosis. In other cases the pia mater becomes involved in the disease, and in these the symptoms of tubercular meningitis are added to those already described. The onset of convulsions may announce the involvement of the meninges of the brain, or no cerebral symptoms may be observed until the occurrence of fatal coma. In other cases the first signs of the malady are abdominal. Ascites may be the earliest symptom, and occurs in association with pain and tenderness in the abdomen. Such symptoms point to the involvement of the peritoneum in the tubercular process. In another form of the disease the symptoms bear a striking resemblance to those of enteric fever, and as enlargement of the spleen is of quite usual occurrence in acute tuberculosis, the difficulty of diagnosis between the two affections may be very great. This difficulty is chiefly pronounced in the case of children, and in them it is often impossible to form an opinion as to the nature of the affection except by the result, recovery proving the case to be one of typhoid fever, whereas in acute tuberculosis death is practically certain. This question is referred to at length in the article on enteric fever.

It must not be forgotten that tubercular disease may exist in remote and little thought-of regions. We have seen cases of acute tuberculosis in which the malady originated in tubercular disease of the vesiculæ seminales. The disease, too, may be located in the testicle, which should invariably be examined. In women, again, tuberculosis is not seldom associated with similar disease of the pelvic organs, it may be tubercular disease of the ovaries or Fallopian tubes. But in whatever way the malady originates, or whatever organs may be attacked, the lungs are almost always involved sooner or later.

It will thus be seen that acute tuberculosis is a general disease with a local expression often especially pronounced in certain organs, the symptoms of their involvement overshadowing, as it were, the tubercular disease of other and

equally important structures. It is in this way that certain types of the malady may arise. Thus, in a large number of cases, especially in children, it is the pia mater which is affected, and the symptoms of tubercular meningitis are in themselves so marked and prominent that they entirely obscure and predominate over those due to tubercular infiltration of the lungs, liver, kidneys, and spleen, all of which organs are almost invariably the seat of tubercular deposit. In the same way the lung symptoms are often very marked, and entirely overshadow those due to similar involvement of the peritoneum. And the symptoms of tubercular meningitis, at first entirely absent, may suddenly appear in a case of what appears to be a tuberculosis affecting the chest or abdominal organs only. For reasons of practical convenience we often speak of tubercular meningitis, or of acute pulmonary tuberculosis; but in doing so, it should always be understood that nothing more is implied than that the brain or lung is the organ chiefly implicated in what is, in truth, a general infective disease.

In infants and young children the diagnosis of general tubercular disease is beset with special difficulties. It may be said that under the age of three the tuberculosis is almost invariably generalised, so that in such cases no symptoms pointing to involvement of any particular organ may exist. Wasting and slight œdema of the lower extremities are very suggestive symptoms, and should always lead to the suspicion of acute tuberculosis being the cause of the child's illness. Slight elevation of the temperature would be an additional reason for anxiety. In such cases it is only too probable that, after the continuance of these symptoms for some weeks or a month or two, the onset of tubercular meningitis may confirm the worst fears as to the fatal nature of the child's illness. Many cases of this description are met with in out-patient practice, and the student should never forget the possibility of a tubercular condition underlying the clinical appearances of bronchitis, wasting, and œdema in young children.

It will not be necessary to say much under this heading, as already in the clinical account of the disease the matter has been to a certain extent discussed. That there is in all cases a predisposition to tuberculosis, either inherited or acquired, must be clear to anyone who has carefully inquired into the evidence obtainable by clinical experience. There can be no doubt that this tendency is transmitted from father to son, but it is equally clear that it may be acquired by neglect of sanitation, and especially by the breathing of tainted, foul air, and the absence of sunlight. Bad drainage and dampness of subsoil are also important factors in exciting attacks of the disease. It is extremely probable that tuberculosis is transmissible through the milk of tubercular cattle, and it may be that this is one of the reasons why the disease is so common in children, especially in the form of abdominal tuberculosis. There is much reason to think that the actual and exciting cause of the disease is the bacillus of Koch, and it is significant that the conditions favourable to an outbreak of tuberculosis are those also which are congenial to the growth and activity of the bacillus, namely, absence of sunlight, dampness of soil, overcrowding, and bad ventilation.

Tubercle is essentially an inflammatory structure, the effect of the bacillus being to produce proliferation of the histological elements of the tissues in which it lodges. For this reason the microscopical structure of tubercle varies widely, consisting sometimes of epithelial cells, and again of indifferent cells and fibrillated elements. The size of the tubercles varies considerably; miliary tubercles, those seen in cases of acute tuberculosis, present the appearance of shining greyish-white granules, of the average size of a pin's head. They may be smaller than this—so small, indeed, that with the naked eye it is difficult or impossible to recognise them, and this is often the case in tubercular meningitis; or they may be considerably larger. The larger masses are often made up by the fusion of smaller

tubercles. They are often of a yellowish colour, and softer in consistence than the grey miliary tubercle. The two tendencies which characterise all kinds of tubercular deposits are, first, to softening and caseation, whereby the tubercular structure gradually revolves itself into a cheesy-looking, yellowish detritus, often full of tubercle bacilli; and secondly, to fibrosis. The latter change leads to the induration and drying up of the lesions through the conversion of the tubercle into a fibroid structure, and is the most desirable eventuality that can occur, for when fully developed, all that is left of the tubercular mass is a cicatricial thickening of the tissue affected, often containing the calcified remains of previous caseation. It is quite usual to meet with such conditions at the apices of the lungs of persons who have died of diseases entirely unconnected with the pulmonary organs, and in whom no recent history of such disease could be obtained. It will, of course, be understood that when tubercle undergoes softening and caseous changes, the tissue in which it is embedded does not escape, but itself suffers severely. In this way the softening of tubercle leads to the breaking down of the lung tissue, with resulting formation of cavity. The suppuration which often ensues is not necessarily due to further changes in the caseous mass, occasioned by the bacilli, but is generally caused by the invasion of the affected tissue by other organisms, such as those which cause suppuration in general.

In acute tuberculosis, whether the symptoms are chiefly abdominal or pulmonary, the patient dies before the changes characteristic of tubercular deposits have had time to ensue. For this reason caseation and softening are usually absent in the lesions found in the bodies of those dead of acute tuberculosis, except as regards the possible focus from which the disease may have started, *e.g.*, an enlarged caseous bronchial gland. No age is exempt from the attacks of the tubercle bacillus when the conditions suitable to its growth and development

are present, but it is relatively more common in early life. Neither is any race of humanity spared, and some are particularly prone to be affected, as, for example, negroes.

The treatment of acute tuberculosis is almost entirely prophylactic. When the disease is once developed it is practically always fatal, and nothing more can be done than to palliate the patient's sufferings. The tendency to tuberculosis must be combated by a rigid observance of the rules of hygiene, and by a careful avoidance of all causes likely to lead to an outbreak of the disease. A suitable climate, abundance of fresh air, nutritious food, and healthy surroundings generally, these are the means by which any hereditary predisposition to the disease must be thwarted. It is only necessary to remark that the treatment by "tuberculin" has led to no satisfactory results, and has now become obsolete. In those predisposed to the disease, cod-liver oil may be usefully administered. In the actual presence of the developed malady the patient must be kept in bed, the temperature reduced by cold or tepid sponging, and cough, diarrhoea, and sweating treated in the manner appropriate to those symptoms.

(Treatment.

ACTINOMYCOSIS

It has now been definitely ascertained that this disease, which was formerly thought to be limited to animals, can be acquired by the human being. The malady has been long known to affect the ox, in whose case it chiefly occurs on the jaw and in the tongue. In both these situations tumours form which, though of very slow growth, may yet attain considerable dimensions. On examination it is found that these masses are of inflammatory nature, and due to the presence of a peculiar micro-organism, known as the ray fungus (*actinomyces*). These growths may remain confined to the regions from which they originate, but they have a tendency to penetrate vessels, and when once they have gained access to the blood, fresh developments of the disease may occur in any part of the body. When the disease affects man the same chain of events ensues as in animals.

Symptoms.

The symptoms of the malady vary with the part of the body affected. The affection is met with in man in the jaws and neck, in the alimentary canal, and in the lungs; much more rarely the skin is involved. The most important seat of the disease, and the one perhaps most usually observed, is the lung. When occurring in the pulmonary organs the affection, as elsewhere, runs usually a very chronic course. It leads to an inflammatory condition which tends to the destruction of the portion of the lung affected, with resulting formation of cavities. The symptoms are those of chronic bronchitis or of phthisis. It is not unusual for the pleura to be implicated in the disease, and empyema may result. The patient wastes, there is cough and expectoration, the latter being

often abundant, muco-purulent, and not uncommonly foetid. It will thus be gathered that there is nothing characteristic in these symptoms; and from them alone, and also from auscultation and percussion, it may be impossible to differentiate the disease from chronic phthisis. But if an examination of the sputum is made, a very characteristic appearance may be found. This consists in the presence of numerous orange-yellow granules, which are in reality shreds of the ray fungus itself. If this discovery is made, there can be no further question as to the diagnosis; the appearance of these granules is characteristic. It must be borne in mind that with the progress of breaking down and cavity formation in the lung tissue pus is produced, and the patient is therefore liable to the hectic fever which is so significant a feature of phthisis, and to the other results of streptococcus infection.

As already stated, actinomycosis of the lung is a very chronic disease, continuing for months or years, and it is in the later stages especially that involvement of the pleura occurs, with resulting empyema. Perhaps next in frequency is the location of the disease in the neck, where it forms massive infiltrations, with subsequent breaking down and the development of fistulæ, the latter discharging externally.

When the disease affects the abdomen, it may be, and generally is, extremely difficult to form a diagnosis. At an early stage nothing may be noticeable on physical examination, and it is only at a later period, when adhesions have occurred between the intestine and the abdominal wall, with thickening and infiltration, that a mass can be made out. If the physical signs occur in the neighbourhood of the cæcum, a condition resembling perityphlitis may result. Indeed, in some cases the latter malady has taken its origin in actinomycosis affecting the vermiform appendix. Sometimes large abscesses are formed which may burrow behind the peritoneum to the back, or into the pelvis. These collections of pus may point and

discharge externally, but the diagnosis will be impossible unless examination of the contents of the abscess yields the characteristic fragments of the fungus to which reference has already been made. When the liver is the seat of the disease, symptoms of hepatic abscess will result.

It may be said, speaking generally, that the clinical manifestations of this disease tend to present themselves under the form of chronic inflammation and purulent discharge, with burrowing and fistulæ, together with the symptoms of chronic pyæmia.

Causation
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It has already been stated that the disease is due to a special micro-organism, the ray fungus. This organism varies in size from about one-fiftieth to one-tenth of an inch in diameter; it is circular in outline, with a radiate arrangement from the centre. These radiations are known as "clubs." The colour of the organism is sulphur-yellow or orange, and when present in pus this bright yellow colour is of great importance in making the granules visible. The actinomyces has been successfully cultivated, and it has been proved possible to transmit the growth by inoculation. The fungus, when introduced into living tissue, acts as an irritant, and the phenomena of chronic inflammation ensue. It is found that surrounding the micro-organism are collections of leucocytes, and at its periphery the formation of new connective tissue is evident.

It will thus be seen that, histologically as well as clinically, the results of the action of the actinomyces are singularly like those of the tubercle bacillus, for in both there is the same tendency to chronic inflammatory changes, with subsequent breaking down and the formation of pus-containing cavities. There can be little doubt that the actinomyces granules obtain entrance to the human body through the inspired air, and possibly through the mucous membrane of the mouth, throat, and especially of the tonsils. It is known that in cattle the parasite is conveyed by the spines and bristles of grass, grain, and other cereals. Thus it is quite easy to understand the

conveyance of the actinomyces through the common habit of carrying straws in the mouth. It must be borne in mind that the tendency to enter the vascular system is equally marked in man and animals, and thus the diffusion of the disease may be very wide. By this means actinomycosis of the lungs may be transmitted to the abdominal cavity, and under these circumstances the liver may be attacked, with resulting symptoms of hepatic abscess.

This consists in the removal of the masses to which the actinomycosis has given rise. No treatment short of the actual removal of the fungus and of its results can possibly be successful. If the disease is accessible, as in the case of the neck and jaws, surgery may be able to cure it; but when the micro-organism has been scattered by the blood current through the body, the condition is far more serious. And in cases in which the clinical aspect is that of phthisis the prognosis is very gloomy. Should abscesses be accessible they should be opened antiseptically, and empyema should be treated in the usual manner by incision and drainage, never by aspiration.

Treatment

SYPHILIS

THE primary manifestations of syphilis come under the cognizance of the surgeon. We do not, therefore, propose to enter into the discussion of the appearances and modifications presented by the syphilitic chancre. But it is of great importance to be aware that syphilis may certainly follow a local lesion which has all the attributes of soft chancre, and, indeed, that any kind of venereal disease may be followed by secondary syphilis. Possibly in these cases the local lesion, either from its situation or from its insignificant proportions, is entirely overlooked. Certain it is that in many cases of undoubted syphilis no history whatever of local affection can be obtained.

Symptoms.

The secondary symptoms of syphilis appear usually from six weeks to three months after the primary lesion is first noticed. The secondary stage is a febrile phase of the disease; the temperature is often but slightly raised at night, it may be to only 99° or 100° . On the other hand, cases occur in which marked febrile reaction is present, the evening temperature registering 103° or even 104° . The febrile symptoms are attended with pains in the limbs, and especially in the head, and sometimes in the collar bones; these pains, and especially the headache, are always worse at night. Frequently the first symptom complained of, and that for which advice is sought, is sore throat. On inspection, the fauces are found to be reddened and swollen. The tonsils are enlarged and inflamed, and on their surface characteristic silvery flat patches are noticed. The appearance presented by these patches—which are by no means confined to the tonsils, but which occur also on the tongue, mucous membrane of the mouth, fauces, soft

palate and uvula—suggests that which is produced by the application of nitrate of silver to the normal mucous membrane. In rare cases during this stage the joints are swollen and tender. We have recently seen a case of late secondary syphilis in which the left elbow and knee-joint were full of fluid. There is not in these articular affections the severe pain and tenderness which characterise acute rheumatism, but in other respects the conditions are much the same in the two maladies, as in both now one joint, now another, is affected; a tendency to polyarthritides is marked. The characteristic syphilitic rash now appears. It is nearly always first noticed on the abdomen in the form of an erythema, the so-called “syphilitic roseola.” This rash resembles an ordinary erythema, but is somewhat darker in colour. It is further distinguished by leaving behind it on fading much dark pigmentation of the skin. This pigmentation may be, and often is, very persistent, especially on the lower extremities, where it may be perceived long after all trace of the rash itself has disappeared. The lymphatic glands of the whole body are now felt to be enlarged, and they may also be tender. This is especially obvious in the groin and in the neck, where the concatenate glands are very easily felt when increased in size. The roseola does not last long; in the course of ten days or a fortnight it fades, and nothing remains but the pigmentation already alluded to. Very often the roseola is so slight that it is not noticed, even by those accustomed to daily ablution of the whole body, and in such cases the first manifestation of the disease consists in the appearance of the eruption which we proceed to describe. This rash follows immediately the stage of roseola, and consists in the development of papules of various sizes and shapes, which occur on all parts of the body, including the face and neck, but which are specially well marked on the back and forearms. This papular rash, along with all other varieties of syphilitic eruption, manifests some highly characteristic features, which are

as follows:—The papules are of a peculiar dusky red colour, resembling that of raw ham, and are very slightly scaly, in some cases not scaly at all. They do not itch. A special predilection is shown by the rash for the flexor, as opposed to the extensor, aspect of the limbs, and on fading much pigmentation remains. The papular rash is by no means the only one present in secondary syphilis. One of the great features of the cutaneous manifestation of the disease is its extreme tendency to polymorphism. Thus macular, vesicular, and pustular eruptions may co-exist with the papules already described, but the vesicular form of lesion is far less commonly met with than the papular. The eruption comes out in successive crops, so that fresh papules are present at the same time as the older ones are fading.

Care must be taken to refer to this skin eruption with regard to its morphology only. Much confusion has arisen from the pernicious habit of talking of “syphilitic psoriasis,” “syphilitic lichen,” etc., while by speaking of a papular, vesicular, or pustular syphilitic rash no possible error can arise. The syphilitic rashes are *sui generis*, and have nothing in common with the simple cutaneous lesions with which they are often in terminology associated. It must be remembered that secondary syphilitic rashes are symmetrical, sometimes an important point in diagnosis.

When, as is frequently the case, the specific papule is situated at the junction of a cutaneous and mucous surface, as at the angles of the mouth and around the anus, it undergoes considerable modification. From the proximity of the parts the lesions touch each other, tend to become flattened out, and covered with an offensive, highly contagious secretion. To this modification of the rash the term *condyloma*, or *mucous tubercle*, is applied.

Such, in a few words, are the signs and symptoms of secondary syphilis. With the passage of time the rash fades, the sore throat amends, and a gradual return to health and strength ensues. But the series of morbid

phenomena which are the result of syphilis are by no means at an end. Instead of the patient returning to a condition of comparative health, shortly after the disappearance of the secondary rash, or sometimes even while the latter is still markedly developed, symptoms and signs to which the term "tertiary" has been applied may appear. We have recently seen a patient in whom a lesion characteristic of the so-called tertiary period appeared on the face four months after secondary symptoms had been well marked all over the body, and at the same time as a late secondary eruption still lingered on the shoulders. It will be understood, therefore, that there is not that marked distinction in all cases between the secondary and tertiary stages of syphilis which was formerly thought to be characteristic of the disease. It may perhaps be said that an intermediate period exists between these two stages in which rashes, generally regarded as being distinctive of the tertiary period, may appear; a certain rash which occurs during the late secondary or early tertiary period is very characteristic, and is known as *rupia*. This lesion consists in ulcerating patches, of a more or less circular outline, in which the products of ulceration accumulate layer above layer, so that a conical form is produced, the cone being composed entirely of the dried-up secretion, and the apex being the oldest portion of the ulcer. Thus a resemblance to a cockle-shell comes about, to the repulsive, dirty appearance of which the lesion owes its name. *Rupia* may occur in any part of the body, but is especially common in the neighbourhood of the knee. But in many cases, as already mentioned, the secondary symptoms entirely disappear, and the patient may regard himself as sound and well. Yet years afterwards, it may be as many as twenty or thirty, and earlier if the patient falls into bad health, gets into poor circumstances, or takes to drink, further manifestations of syphilis present themselves. The most important of these late lesions is the *gumma*. This consists of masses of inflammatory tissue, which may be seated in

almost any organ or tissue of the body, and which are of common occurrence in the skin, where they at first appear as hard, painful lumps, which are tender on pressure, circular in outline, and which tend to soften, break down, and ulcerate. The result is the formation of an ulcer, presenting a very characteristic appearance. It has clean-cut edges, with steep sides, and looks as if it were punched out in the skin, the surface being covered with a freely discharging slough. Another form of tertiary cutaneous lesion is also extremely characteristic. Large tracts of skin may be the seat of a chronic, thickened, and slowly ulcerating patch, of a dark red colour, the active edge of which is covered by thick, dried-up products of the ulcerating process. This lesion is raised above the skin, as can be distinctly made out on feeling it with the finger. It pursues a serpiginous track, healing at one part where scarring occurs, and progressing at that edge, already mentioned, where the discharge dries up with crusts. To this lesion the term "tubercular syphilide" is applied, it being remembered that the term "tubercle" simply means a large papule; the union of many papules gives rise to the large patches of ulceration which form such a characteristic feature in tertiary cutaneous syphilis. This lesion may occur in any part of the body, from the crown of the head to the sole of the foot. This and other tertiary lesions of the skin are markedly unsymmetrical, a feature in which they differ essentially from the rashes of the secondary period. Tertiary syphilis may also occur in the palm of the hand, giving rise to a thick and more or less scaly patch, ulcerating and healing in the manner just described, or without any breach of surface. When the latter condition is present, the term "syphilitic psoriasis" has been most inappropriately applied, as this palmar syphilide has absolutely nothing in common with psoriasis. Like other tertiary lesions, the palmar affection is strictly unilateral.

Affections of the osseous system occur in tertiary syphilis. The bones of the nose, the turbinated bones,

and the spongy ethmoid bones are specially liable to be involved, and discharge, with exfoliation of pieces of bone, and resulting deformity, may ensue. The long bones are also liable to be affected. Ulceration of the hard and soft palate, with extensive destruction of the uvula and other soft structures, and not seldom with perforation of the hard or soft palate from the sloughing out of a gumma, is of frequent occurrence.

Syphilis has a marked tendency to attack the nervous system. These nervous lesions may occur at any period from three to eighteen years after infection; but they may appear earlier, or as late as twenty-six years after the healing of the chancre. There is a marked tendency for the arteries of the brain to be affected by the syphilitic poison, with a resulting thrombosis and consequent softening. Syphilitic gummata may occur in any part of the brain or cord and their membranes; but they have a special predilection for the base of the brain, and when occurring there must obviously tend to involve the numerous nerves situated in that locality. Among these nerves the third is affected with special frequency; less often the sixth is also involved. Hence in syphilitic disease of the brain paralysis of some of the branches of the third nerve, shown by ptosis, or by paralysis of some of the ocular muscles, is of very frequent occurrence. Hemiplegia, too, often ensues on the side opposite the ocular paralysis. Such symptoms should always lead to the suspicion of syphilis being their cause. Indeed, in treating nervous disease generally, the possibility of the case being of syphilitic origin should never be lost sight of, and hemiplegia occurring in young persons, in whom neither heart nor renal disease is present, and in whom the loss of power is not congenital, should always suggest the possibility of a syphilitic history being an important factor in the case. It is quite possible that in locomotor ataxy there may be some foundation for the belief that syphilis is a cause of the disease, and it is certainly remarkable in how large a proportion of these

cases a syphilitic history is obtainable. The peripheral nerves, as well as the brain and cord, may be attacked by tertiary syphilis. Severe pain may result from their implication, and the pain is often paroxysmal and worse at night. In some cases a gumma compressing a nerve may cause the appearance of a cutaneous eruption strongly suggesting herpes. The possibility of such a condition being present should be borne in mind when treating aberrant forms of what seems to be non-syphilitic skin disease. We have known of cases in which quack medicines containing iodide of potash effected a cure when the result of orthodox treatment had been negative. This is a point worthy of note.

We have seen the symptoms of progressive muscular atrophy and those of anterior polio-myelitis simulated by syphilis, and it may be said, in general, that there is scarcely a disease of the brain and cord and their membranes, or of the peripheral nerves, which may not be counterfeited by this insidious disease. The possibility of syphilis being behind the symptoms must, therefore, never be lost sight of in treating diseases of the nervous system.

In tertiary syphilis the general health is often severely compromised; a special form of wasting may set in, with great depression, which may terminate fatally. In some cases in debilitated subjects the disease attacks the lungs, producing a form of phthisis which has been described as syphilitic. It is probable that this occurs only in those otherwise pre-disposed to pulmonary disease.

It must never be forgotten that the division of the malady into three stages is, after all, more or less arbitrary. These divisions are undoubtedly convenient from a practical point of view, but it is by no means clear that this fixed and invariable method of dividing the disease is an unmixed blessing. It is too often thought that these stages are really natural divisions of the affections, and that no exceptions in the order of manifestation of symptoms and physical signs can be permitted. It is

possible that in this matter prejudice may have tended to lead into error. Cases undoubtedly occur in which close and trained observation have failed entirely to detect any primary or secondary symptoms, and in which those features usually considered to be characteristic of the tertiary stage have alone shown themselves. The phenomena of hereditary syphilis are not satisfactorily accounted for by the routine explanation of the successive phases of the disease, and it is not impossible that there may be, in some cases, a manifestation of the malady in what appears to be its later stages without any previous signs whatever having appeared.

It is particularly important for the student to accustom himself to recognise the manifestations of every possible form of syphilis, both in its cutaneous developments and otherwise, by the eye and the other senses only. In many cases questions cannot be directly put, and in women it is but seldom that the history of primary sore can be obtained.

Impure sexual intercourse is of course the most usual manner in which this disease is acquired, but not seldom syphilis is communicated to perfectly innocent persons in other ways. Thus the malady may be acquired by kissing, by the use of towels, hair-brushes, or combs of an infected person, and occasionally a medical man is inoculated in the course of his work, as in making a vaginal examination. The secretion of condylomata is particularly virulent. In all cases it is necessary to assume a breach of the cutaneous surface, but there can be no doubt that a very minute scratch, or even abrasion, of the epidermis is all that is required. There can also be no doubt about the contagiousness of the secondary lesions; but opinions differ considerably as to the power of tertiary manifestations of the disease in this respect. It is better to regard any syphilitic lesion as possessing the potentiality of communicating the disease.

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There can be little doubt that syphilis is a specific febrile malady, of which the chancre is the point of inoculation, and the cutaneous and other lesions the local

expression in the different systems and organs. The more or less definite course of the malady, the fever which attends it, and the affection of the general health all point in this direction. It need scarcely be said that in these days of bacteriological enthusiasm (not always tempered with discretion) great efforts have been made to isolate the "bacillus" of the disease. Such efforts have so far led to no definite result, and the micro-organism yet remains to be discovered.

The morbid appearances of syphilis are due to inflammation, and are most clearly obvious in the structure of the characteristic gumma. This is a firm, more or less circular, mass embedded in the skin or in internal organs, which on microscopical examination is found to be made up of cells resembling leucocytes and those of granulation tissue, with new growth of fibroid nature. The vessels are most abundantly distributed at the periphery, and become much less numerous at the centre of the mass. Here the cells are more or less in a stage of softening and fatty degeneration, or are the seat of caseous changes. It is this central portion which, by its necrosis, leads to the ulceration and sloughing out so often seen in gummata of the skin and in those of the palate. When healing takes place, the new growth of fibroid tissue, to which reference has already been made, by its contraction closes up the wound; but, naturally, marked scarring results. Other characteristic tendencies of syphilis are to produce chronic inflammatory thickenings of the capsules of organs, such as those of the liver, spleen, and kidneys, and especially to initiate disease of arteries. This last feature is an extremely important one. The lesion involves the inner coat of the vessel; this becomes beset with numerous cells of the granulation tissue type, and which possess a strong tendency to be developed into an imperfect fibroid tissue. The result is the narrowing of the arterial channel, and the liability of the diseased arterial wall to become the seat of thrombosis. The arteries of the nervous system are

particularly prone to this morbid change. There is no tissue or organ of the body which may not be the seat of the syphilitic inflammation ; but wherever the morbid process appears, its results are always the same—the formation of gummata, fibroid thickening, and characteristic disease of the vascular wall. Leucocytosis is apparently present at all periods of the disease.

It is practically conceded that in mercury we possess a specific against the poison of syphilis in the early stages of its activity. The rule is to administer the drug in small doses for a long period of time. Nothing is better than grey powder, which may be given in one or two grain doses, combined with a grain or two of Dover's powder, in pill three times a day. Some prefer Plummer's pill, the green iodide, or even blue pill. In cases in which mercury administered by the mouth causes diarrhœa or digestive disturbance, half a drachm of blue ointment may be rubbed into the axillary region of the chest wall every day. This is a dirty but effective way of exhibiting the drug ; when employed, care must be taken to preserve strict cleanliness, and to be on the watch for the manifestations of salivation which in some people are soon developed by this mode of treatment. Probably the particular form of the drug is immaterial, so long as salivation is not induced. This should invariably be guarded against. The patient should be cautioned to avoid all excesses in eating and drinking, and indeed it is best for him to eschew alcohol in any form. This treatment must be persisted in for many months, and continued for some time after all secondary symptoms have disappeared.

Treatment

In the tertiary stages of the disease iodide of potassium is of great use, at least so far as regards cutaneous lesions. Under its administration these disappear in a remarkable manner, and still more quickly if some weak mercurial ointment is at the same time applied to them. But relapses will very possibly occur, which again heal up with the former marvellous rapidity

when the iodide is resumed. In many cases it is well to combine drachm doses of the Liq. Hydrargyri Perchlor. with the iodide.

Advice may be asked as to the question of marriage after an attack of syphilis. It is not easy to lay down rules, but certainly a year at the very least should intervene between the latest secondary manifestations and marriage. In many cases it will be desirable to prolong this interval still further.

HEREDITARY SYPHILIS

THE results of syphilitic infection are not limited to the patient. His or her children are liable to suffer from the disease, and this either at a very early or at a later period of life. Indeed, the foetus *in utero* may be infected to such an extent as to cause still-birth, abortion being in a very large number of cases the result of syphilitic disease in the parents. On the other hand, it seems certain that no obvious manifestation of the malady may ensue until a later period of life, often at or about the age of puberty. It is, of course, probable that in such cases the disease may have been present during infancy, but in such a slight form as to have escaped detection.

Syphilis may be transmitted to the offspring either from the father, the mother, or from both parents; the danger of transmission appears to be always greater when the mother has suffered from the disease, and when both parents are affected the risk is extremely great. The liability of syphilis to be transmitted to the offspring depends, to a large extent, upon the period of time which has elapsed since the parents have suffered from the disease and the conception of the child. The longer this interval is the less the risk that the malady will descend. Thus the first pregnancies of a marriage may end in successive abortions, until in the course of time a living child is born. It is a well-known fact that although a mother may bear a syphilitic child, yet she herself may remain free from all appearance of the disease. In such a case, too, she will not be infected although she suckle the child. This immunity on the part of the mother was first propounded as a law by Colles, and is known as "Colles' law." It is

difficult to explain the facts except on the assumption that the mother has, in some way, become immune to the disease through the influence of the foetus.

Symptoms.

As already mentioned, when one of the parents is actually suffering, or has recently suffered from the disease, abortion will probably occur, the foetus bearing the characteristic marks of the malady, which will be immediately described. Should the virus of the disease be transmitted in a less malignant form, the child may be born alive, but small, wizened, ill-nourished, and with skin eruptions of a bullous or pemphigoid character, which are particularly well marked on the hands and feet. In such cases rapid emaciation generally ensues, in spite of every care, and death speedily ends the scene. In most cases the child is born of healthy appearance, presenting no abnormality whatever, and it is only after the lapse of some time, usually from three weeks to two months, that changes occur which arouse suspicion that all is not right with the child. Very often the first thing noticed is a "cold in the head," accompanied with a nasal discharge causing "snuffling." The discharge may be clear and serous, or sanguineous and sero-purulent. At the same time, or a little later, rashes are noticed on the body and limbs. The most usual localities for the first appearance of the rash are the lower abdomen, the genital organs, around the anus, on the buttocks, and the inner side of the thighs. But other localities are also affected, and in bad cases the whole body may be the seat of eruption. The rash is, in its earliest manifestation, usually erythematous, and of a dull red or copper colour, but it is often papular, the papules being also dark red in colour, and but very slightly scaly. Vesicular and pustular rashes are also met with, but less frequently than the erythematous and papular forms. Condylomata, or mucous tubercles, are of common occurrence, being particularly well marked round the anus at the junction of skin and mucous membrane. At the angles of the mouth mucous tubercles have a tendency to ulcerate

and to form very painful fissures ; these fissures are known as *rhagades*, and they leave scars on healing which persist and assist in forming that facies which is so striking a feature of hereditary syphilis in the patient's later years. The mucous membrane of the mouth is also affected, and presents silvery patches, which at a later stage may form ulcers. The secretion of all these lesions, rhagades, condylomata, and patches in the mouth is extremely contagious, just as in the secondary stage of acquired syphilis in adults. The fauces, tonsils, soft palate, and uvula may all be the seat of the patches just alluded to.

Coincidentally with the development of the rash the child wastes, and this very rapidly ; the skin hangs loose on the attenuated body, and is itself dry and harsh, and of a dirty brown colour, and wrinkled. The wizened, aged face of the child becomes still more evident, and the resemblance to an old man is in some cases really striking. The nasal discharge persists, and may become more marked. The result is that the child experiences increasing difficulty in taking the breast, as, the passage of air through the nose being obstructed, it has to pause continually in the sucking process in order to breathe. Much, probably, of the general wasting of the body is due to this inability of the child to obtain sufficient nourishment.

Hoarseness of voice, due to laryngeal catarrh, is of very common occurrence, and is caused in some cases by the presence of mucous patches in the larynx. The inflammatory process in the fauces may extend to the Eustachian tubes, and deafness may result. The nasal discharge may be attended with necrosis of the nasal bones, or of the supporting septum, and falling in of the bridge of the nose will then ensue. The long bones are occasionally the seat of syphilitic lesions. The disease may cause inflammation at the junction of the epiphysis and shaft, causing symptoms resembling those often met within scurvy-rickets, or it may attack the periosteum. In the former case it is noticed that the limb is weak or

powerless, and on examination the region of the affected epiphysis is found to be swollen and tender. Suppuration may occur, with complete detachment of the epiphysis, and the joint may become involved, but this is rarely the case. When the periosteum is the seat of disease, swelling and tenderness of the shaft of the affected bone arise, and, as in the case of the epiphysial affection, suppuration may ensue. The loss of power in the affected limb may lead to the erroneous assumption that paralysis is present, whereas the weakness is really due to the bone affection.

Another, and not uncommon, manifestation of hereditary syphilis is dactylitis. One or more of the phalanges, and the proximal rather than the distal, becomes swollen and tender; the swelling is fusiform, and practically painless. Redness of the overlying skin is sometimes present, but it is unusual for suppuration to occur. The metacarpal or metatarsal bones may also be affected in a similar manner. The condition must be carefully distinguished from tubercular or strumous dactylitis. In the latter there is far more pain and tenderness, and the tendency to suppuration is much more marked. The history of the case and the appearance of the child will also enable the diagnosis to be made as between the two conditions. Syphilitic affections of the nails are observed, the so-called "syphilitic onychia" being not uncommonly met with. It is a question whether real paralysis, due to affections of peripheral nerves, may occur; such cases have, however, been described. Cranio-tabes is a manifestation of hereditary syphilis which is sometimes met with. In this condition portions of the cranial bones are found to be unduly thin, and this especially in the occipital region. These thinned patches, which yield under pressure of the finger, are readily detected, and should always be looked for.

The internal organs do not escape the ravages of the disease. Enlargement of the liver and spleen, from the

development of a new interstitial fibrous overgrowth, is by no means uncommon. The liver may be unduly large in rickets, but increase of size of the spleen is highly significant of syphilitic disease when occurring with other physical signs of the malady. The enlarged organs are generally hard and resisting. The testicle also may be the seat of a similar overgrowth, showing itself in enlargement of the body of the organ, not seldom accompanied with effusion into the tunica albuginea. Iritis has been described as occurring in hereditary syphilis; it is certainly very rarely met with.

Every grade in the severity of the disease may be encountered. In some cases the symptoms are but slightly developed, and the infant rapidly regains a healthy appearance. In others the patient is crippled for life. In most cases serious results ensue; the development of the child is often arrested, the form becomes stunted, and the changes incidental to the age of puberty do not take place in a normal and complete manner. Such cases are easily recognisable. The scarring round the mouth, the large head, the depressed bridge of the nose, together with the general appearance of imperfect development and weak health, make up a picture the significance of which cannot be mistaken. In the case of hereditary syphilis further changes, too, may appear at the age of six or seven, and onwards. Interstitial keratitis, causing a steaminess of the cornea, is of common occurrence at this age. It generally amends under appropriate treatment, but opaque patches may be left, and cause abiding injury to vision. The permanent middle upper incisors sometimes assume a more or less characteristic appearance. These teeth become narrow towards the cutting edge, which also presents a notch in the border. At this period of life, too, gummata may soften, and give rise to deep ulceration and perforation of the soft palate, and periostitis, leading to thickening and deformity of the shaft of the long bones, may be met with. These morbid appearances may all be

delayed until the age of fourteen or fifteen, or even later.

It has been mentioned that the infantile manifestations of the disease may have been so slight that they have been entirely overlooked, and the so-called "late" manifestations of the malady are probably in all cases relapses of the disease, the early signs of which were of this evanescent and indefinite character. We have lately seen a case in a boy of fourteen, in all respects a well-developed, healthy lad, entirely free from the least suggestion of hereditary syphilis, in whom a series of gummata presented themselves in the skin over the shaft of the tibia. Rapid amendment followed the administration of iodide of potash.

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The morbid anatomy of infantile syphilis differs in no respect from that form of the disease which affects the adult. It is unnecessary, therefore, to give an account of the morbid changes affecting the sufferer from hereditary syphilis, as it would simply be a repetition of what has already been said on this subject under the head of syphilis generally. A marked leucocytosis is frequently observed in the hereditary form of the malady.

Treatment.

The essential point in the treatment of hereditary syphilis is the administration of some form of mercury. For infants nothing is better than grey powder, a grain night and morning. Should grey powder not agree, mercury may be given in the form of minute doses of calomel or of the *Liquor Hydrag. Perchlor.*, in the dose of 15 or 20 drops twice a day. In cases in which all forms of the drug administered by the mouth disagree with the child, resort must be had to inunction of blue ointment. A piece of mercurial ointment about the size of a hazel nut may be spread over the flannel binder before the latter is applied to the body; the movements of the child and the warmth of its body cause the rapid absorption of the drug. This method is efficient and simple, but is dirty, and therefore requires great care and attention. The body of the child

must be washed all over with soap and water before the flannel bandage is reapplied. The child should be suckled by the mother only; on no account should a wet nurse be allowed to suckle the child, as the disease is practically certain to be communicated to her. If the mother is already undergoing mercurial treatment, it may not be necessary to administer the drug to the child; but if, as is so often the case, the mother is unable to nurse the child, or the milk is not sufficiently rich to nourish the infant, the latter must be either hand fed or at all events the maternal supply of nourishment must be supplemented. Resort to hand feeding may be rendered necessary through the child being unable to take the breast, owing to the nasal catarrh blocking the passages. In all cases of nasal discharge great care must be taken to keep the passages clear, and to remove secretion as soon as formed. This is best done by bathing the parts, and then applying a weak mercurial ointment. Care must be taken to observe all hygienic rules, and especially to let the child have plenty of fresh air. In all cases the utmost precaution must be taken that the malady be not transmitted to healthy persons—nurses and others—who have to do with the care of the child. Particularly dangerous in this sense are the mucous tubercles, and the immediate destruction of all dressings which have been in contact with the child is of paramount importance.

ANTHRAX, OR MALIGNANT PUSTULE

THIS is a disease affecting both cattle and man, due to the introduction into the blood of a definite bacillus—the *bacillus anthracis*.

Symptoms.

The clinical manifestations of this malady vary according to the route by which the bacilli gain access to the system. In by far the large majority of cases this is by a superficial wound or abrasion of the skin, and the affection is therefore chiefly seen in those who have to do with cattle, and in veterinary surgeons. But in rare cases the bacilli obtain access to the human organism by the air passages, or by the gastro-intestinal tract. As usually seen, shortly after inoculation redness and swelling occur at this point, the veins are prominent around the reddened patch, and the lymphatics become evident by the line of inflammatory redness which develops between the seat of injury and the nearest glands. Pain and throbbing are complained of, and fever sets in, with thirst, headache, and prostration. Vesicles now appear on the inflamed area, whose contents are serous or sero-sanguinolent. The vesicles soon rupture, the contents dry up, and are frequently detached, leaving an ulcer. In the meantime the inflammatory redness extends, and fresh but smaller vesicles form. These also rupture, the contents forming a slough, which sooner or later covers the whole affected area. The lesion contains the anthrax bacilli, and these obtain access to the lymphatics, and thence to the blood system. The symptoms are now those of acute septicæmia, with frequent occurrence of embolism. Diarrhœa is a usual symptom.

In other cases of anthrax at the very earliest stage, and before the appearance of the characteristic lesion, the first indication may be the formation of a minute red spot with a darker centre, such as occurs so often from the bite of an insect. Probably this small lesion would pass altogether unnoticed were it not for the constant itching and irritation to which it gives rise.

Most fatal cases of anthrax terminate within two days, the patient often dying of exhaustion. There is an incubative period, but its duration seems very uncertain. It has been found to vary from a few hours to seven days.

A few words must be added on that form of the disease which is due to the entrance of anthrax bacilli into the lungs. This is sometimes the case with wool sorters and others who have to do with hides or hair taken from animals which may have died from anthrax. The malady has been so often observed amongst the class referred to that it is frequently known as "wool sorters' disease." In this case the symptoms may not be at all characteristic, and if the occupation of the patient is unknown, much difficulty may arise in establishing the diagnosis. Usually the symptoms observed are sudden weakness and giddiness, sometimes chills and vomiting, together with considerable elevation of the temperature. Cough is often present, and if expectoration occurs the bacillus will probably be found in the sputum; pneumonia, pleurisy, or pericarditis may develop. If the patient survive, characteristic anthrax lesions may occur on the skin in different parts of the body. Death is generally due to heart failure, and is seldom delayed beyond five or six days. This form of the disease is practically always fatal. When the virus is taken in by the gastro-intestinal tract, the symptoms resemble those just described, with the addition of severe diarrhœa and a far greater tendency for the skin to be the seat of anthrax lesions, if the patient survive long enough for these developments to take place. Death often occurs

within a few hours, and life is seldom prolonged over two or three days.

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Anthrax was the first disease which could, without doubt, be attributed to the effects of the introduction into the human organism of a definite microbe. The demonstration is remarkably clear and convincing, and the comparatively large size of the bacillus makes observation easy. The bacillus is not motile, and the individual bacilli often form long chains. As a rule, the ends of the bacilli are square. As long as this organism is supplied with plenty of suitable nourishment spore formation does not usually take place; only when its food is exhausted are spores rapidly formed. It seems, too, that spore formation occurs only when the bacilli are freely exposed to air, and that it does not take place in the blood or tissues of the victim of anthrax. The enormous multiplication of the bacilli which occurs in the blood is a very striking and significant fact. The disease is transmissible to man and to the herbivora, but to a much less extent to the carnivora.

When an animal dead of anthrax is left in a field, or carelessly buried, the infection by the disease of animals pastured on the same ground is certain. After the death of the animal spore formation rapidly takes place in the bacilli, the latter dying. The spores are extremely tenacious of life, and are only destroyed with the utmost difficulty. The animal pastured on the tainted field is attacked by the spores, which obtain access to its blood stream by passing through slight abrasions of the mucous membrane of its mouth. Bacilli are also passed in the evacuations of the affected animal, and then spore formation commences, and the soil may become contaminated in this way also, the spores being taken into the alimentary canal with the fodder obtained from the infected field.

The symptoms of the disease in animals are much the same as in man, but the local lesions are far less marked. There can be no doubt that the disease may be propagated by the

bites of insects which have fed on the blood of cattle, themselves the victims of the anthrax bacillus. There is no reason to believe that an attack of anthrax protects the subject from subsequent attacks, either in man or in animals. Efforts have been made to produce immunity by protective inoculation. All such attempts have signally failed.

The post-mortem appearances are those met with in cases of death with high fever ; softening and enlargement of internal organs, especially of the spleen, oedema of the lungs, blood-staining. Anthrax bacilli are particularly abundant in the spleen.

Prophylaxis is of the greatest importance. Special care Treatment. should be exercised in the disposition and destruction of the bodies of diseased animals. The urine, and fæces contain anthrax bacilli, and therefore the utmost care should be taken to ensure their destruction. Particular pains should be observed in making examination of the bodies of human beings or animals dead of this disease to avoid inoculation. A slight abrasion of the skin in such cases may lead to a fatal result. Suspected rags, hides, or wool should be disinfected or destroyed. As regards the treatment of the developed disease, success will be obtained in direct proportion to the rapidity with which remedies are applied. The local lesion should be opened up, and the whole plentifully covered with carbolic acid. Some recommend the application of the actual cautery, and strong acids are also occasionally used. The prognosis is very unfavourable when sufficient time has elapsed to allow of the diffusion of the bacillus. Both the intestinal and pulmonary forms of the disease are very fatal.

GLANDERS AND FARCY

GLANDERS and farcy are one and the same disease. In the first mentioned, however, the symptoms of farcy occur, with the addition of a foul discharge from the nose. They are equine diseases, transmitted by contact to man, and hence are especially observed in those who have to do with horses, viz., grooms and others, and they run either an acute or chronic course.

Symptoms.

After inoculation with the poison of the disease the wound generally shows signs of inflammation, and shortly afterwards, in acute cases, constitutional symptoms appear. These include fever, which is not usually very high, and pains in the limbs and joints, giving the disease a certain resemblance to acute rheumatism. Very soon the eruption appears, and consists of papules of red colour, which quickly suppurate, and of hard lumps which are felt deeply situated in the muscular tissues, and which also rapidly undergo suppuration. These are the so-called "farcy-buds," and may be due to inflamed lymphatic glands. Later in the disease, generally, but not invariably, the characteristic nasal discharge appears. Being usually a late symptom, it loses much of its importance in the diagnostic sense. It is at first a thin secretion, free from blood; but soon afterwards it becomes blood-stained, thick, and extremely offensive. The nostrils are much swollen and reddened, and the discharge, gaining access to the air passages, may cause fatal pneumonia. The fever continues, severe delirium may occur, and the patient becomes weaker and weaker; diarrhoea is a frequent symptom, and may exhaust the patient. Death may occur from collapse and coma, from pneumonia or asthenia; it

often ensues about the end of the second or beginning of the third week of the illness. The condition is, in truth, a septicaemia, and the symptoms are those associated with septic poisoning.

But, as already mentioned, glanders may also assume a chronic form. In these cases, slight fever, indefinite pains in the limbs, and general ill-health are also present, and the sores already described tend to become chronic ulcers, little or no healing tendency existing with regard to these lesions. Discharge from the nose may occur, but if so, it is a much less prominent symptom than in the acute malady. It may also disappear and recur. Cases of chronic glanders may persist for months or even for some years, and are by no means easy to diagnose. The complaint may terminate fatally, and sometimes by an outbreak of the acute disease; and if recovery does occur, convalescence is often very slow and tedious. In chronic and in acute glanders the symptoms are clearly those of a septicaemia. The nasal discharge is by no means invariably present, and must not be insisted upon as a *sine quâ non* in diagnosis.

It appears that the active agent in the causation of the disease is a bacillus, to which the term *bacillus mallei* is applied. It is rod-shaped, and not unlike the bacillus tuberculosis; the bacillus is aerobic, and is easily cultivated, especially upon the surface of potatoes. The bacilli are contained in the nasal discharge and also in the farcy-buds, and it is doubtless by inoculation of these matters that the disease is communicated. A preparation of the cultivated glanders bacillus is known as *mallein*, and is used in veterinary medicine as a test for the presence of the disease in doubtful cases. If minute quantities of this product be injected in the case of an animal already suffering from glanders, a higher temperature results, as the effect of the operation, than would be the case if the subject were sound. It has been clearly shown, however, that this reaction does not specially depend upon the toxin of the glanders bacillus,

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as the toxins of other micro-organisms are equally efficient. It has been suggested that the same mode of diagnosis might be adopted in a doubtful case of glanders in a human being. Inoculation of a guinea-pig with the nasal or other secretions would, however, seem to be a far preferable proceeding. It is said that, if the case is one of glanders, the testicles of the guinea-pig will inflame and suppurate in a few days.

The post-mortem appearances in cases of death from glanders are those due to the cutaneous lesions, and to the so-called farcy-buds; otherwise the appearances are in no wise characteristic, being those observed in death from pyæmia and septicæmia.

Treatment.

Prevention of the disease is the chief end to be attained. The utmost care should be exerted that no diseased horse escape slaughter. This can only be effected by rigorous inspection and the enforcement of strict notification. Drinking troughs are a fertile cause of the propagation of glanders; they should be under close and constant inspection. No remedies are known which have any influence on the developed disease; the case can only be treated on general principles. It is at present far too early to make any definite statement with regard to the efficiency of mallein injections. Time alone can show whether good results can be anticipated from this mode of treatment.

FOOT AND MOUTH DISEASE

THIS is a disease of cattle which is transmissible to man. In cattle the malady is attended with fever, and with the formation of vesicles on the feet and in the mouth. Sometimes the udders are affected with the vesicular eruption. The disease in cattle is not, under ordinary circumstances, fatal, but in some cases complications (pneumonia, etc.) arise which carry off the animal. As would naturally be inferred, those who are in daily contact with the animals liable to the disease are those chiefly affected. Foot and mouth disease may also be transmitted to children and others who have nothing whatever to do with the original source of infection. And it would seem that the latter may be carried by means of the milk of a sick animal. Butter and cheese made with contaminated milk may also apparently transmit the complaint. There would appear to be an incubative period in this disease, though it is not yet possible to state its duration with accuracy. It has been observed to vary from a day or two to a week or eight days.

The first symptoms noticed are those which attend Symptoms. most febrile diseases: headache, nausea, pains in the limbs, and debility. As a rule, the grade of fever is not high— 101° or 102° , rarely over 103° . Soon vesicles appear on the lips, in the mouth, and on the tongue; they quickly rupture, and their turbid contents dry up on the surface of the erosion thus caused. In this way slight stomatitis results, which gives rise to salivation and pain in eating and speaking.

When the eruption is developed the temperature falls, the excoriations in the mouth rapidly heal, and in four or five

days the patient is convalescent. As a rule, the affection runs the mild course just described, but in some cases more serious symptoms have been observed, such as gastro-intestinal disturbance, or a tendency to hæmorrhage, and occasionally pneumonia has developed. In all such instances the duration of the malady is prolonged, it may be for some weeks.

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It is clear from the above account that unless its origin is known, it may be extremely difficult or even impossible to diagnose the disease when occurring sporadically. It is important to be aware that the vesicular eruption may not affect the mouth exclusively; in some cases it may be found on the body generally. When the rupture of the vesicles has led to excoriation of the mouth the case may easily be mistaken for one of stomatitis, especially when the vesicular stage has not been observed. Only in those cases in which severe diarrhœa, pneumonia, or hæmorrhage occur is the prognosis serious. Most cases recover completely.

The disease is in all probability due to the presence of a micro-organism. Several of these have been isolated and described, but it cannot at present be said that anything definite is known as to the connection between such microbes and outbreaks of the malady.

Treatment.

This consists in the use of mouth washes containing boracic acid or chlorate of potash, in the careful management of any complications which may arise, and in the regulation of the hygienic surroundings and of the diet. Milk from a cow suffering from this disease should on no account be used, and the same remark applies to the flesh of the animal. During the prevalence of the disease all milk should be boiled before consumption. Diseased cattle should, of course, be at once segregated.

HYDROPHOBIA

HYDROPHOBIA is a disease of specific nature which is transmitted to man by the bite of an animal suffering from the malady known as "rabies." There can be no doubt that the virus of the disease is communicated to the bitten person through the saliva of the attacking animal, which is generally a dog, but may be a cat, wolf, fox, or horse. A peculiarity of this affection is the long period of time which may elapse during which the virus remains latent in the system. The wound usually heals in a perfectly normal manner, and nothing more occurs, it may be for weeks or months. Generally, symptoms of the disease manifest themselves within the first two months, but cases have been detailed in which the incubative period has extended to a year and a half, and even longer periods of latency have been recorded. In many cases the symptoms appear within three weeks of the bite.

At an early period of the malady the symptoms consist of a peculiar restlessness and anxiety. Along with this there is much depression of spirits, and the patient is frequently sleepless. There is often at this period a curious dislike to water, or to the thought of swallowing, and not seldom uneasy sensations are complained of in the neck and about the angle of the jaw. Sighing is sometimes noticed. After this condition of things has lasted one or two days, or occasionally without anything of the kind occurring, the symptoms of the fully developed disease set in. These consist in violent spasms of the respiratory muscles and of those of swallowing. The spasms come on in paroxysms; they may be excited in many ways, but most surely by the sight or even sound of water. If the patient tries to drink,

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a spasm immediately occurs. The attacks are characterised by deep inspirations, and when fully developed, the spasms involve all the accessory muscles of respiration, the contraction of the muscles of the mouth causing the appearance of the *risus sardonicus*. The spasmodic contraction of the muscles tends to become general, and the patient may pass into a state similar to that observed in tetanus, opisthotonos even being present. A frequent occurrence is the spitting of the patient in all directions. There appears to be an over-secretion of viscid saliva, and the patient endeavours to get rid of this by expectoration. Sometimes he will spit directly into the face of the bystanders. *Priapism and much sexual excitement are not infrequently observed. Mental changes often make their appearance, and frequently the patient becomes violently delirious, and may become maniacal. Short of actual frenzy, delusions and hallucinations are nearly always present, persisting even between the spasms. The patient is agitated, talking incessantly, and often incoherently.

A much rarer form of the disease is that in which paralytic symptoms, hemiplegia, or paraplegia, predominate; such cases have, however, been described.

As a rule, death ensues from exhaustion, and is not usually long delayed. Within four days generally from the commencement the end has arrived, and the fatal event may occur even earlier. But death may ensue during a spasm, and then the end comes suddenly, and from asphyxia. In some cases a fallacious improvement in the symptoms may take place before the fatal termination. Recovery from this disease is practically unknown.

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Rabies in the animal causes hydrophobia in man when the saliva is inoculated on the latter by means of a bite from the former. The endeavours to isolate the morbid entity have hitherto all ended in failure. All the evidence that is available, however, points to the existence of such an entity. The activity of the morbid principle is especially vigorous on the nervous tissues of the affected

animal, and there can be no doubt that, both in animals and in man, it has a special predilection for the nervous system. The medulla oblongata is the most liable of all parts of the nervous structure to be affected.

The naked eye appearances of the body in those dead of hydrophobia cannot be described as characteristic. The pia mater is often congested, as is also the cerebral substance, which may be unduly soft. Similar changes are found in the pia and substance of the spinal cord. The respiratory mucous membrane is inflamed, and lobular pneumonia may be present. The kidneys present a similar appearance, viz., that of congestion. There is nothing characteristic in such changes. They are often observed in other maladies, and when fever is present. Microscopically, disintegration of nervous tissue has been described—alterations in the nerves, in the sense of degenerations of the same, and escape of leucocytes from the vessels. These changes, too, cannot be said to present anything characteristic.

The wound or wounds should be cleansed and efficiently cauterised at the earliest possible moment after the receipt of injury. A bandage should also be applied to the limb above the bite. It is impossible to over-estimate the importance of early cauterisation, and every effort should be made to make it thorough. The dog should, if possible, be kept under observation, and not destroyed, as is too often the case. Treatment.

When inoculation has been complete, the only treatment holding out any hope is that of Pasteur. This treatment should be adopted as soon as possible after the wound has been inflicted, as success depends greatly upon its early employment. The rationale of the treatment is the annulling of the poison by the rapid injection of the principle obtained from a rabid rabbit. In the first injection the morbid matter is employed in a very weak form, but the strength is rapidly increased to a certain maximum. The material employed for injection is an emulsion of the spinal cord of the animal which has died

from rabies. These emulsions are prepared of various strength. The technique is long and complicated, and the treatment can, of course, only be carried out in a properly equipped laboratory. Efforts have been made to cure the disease by means of serum therapy, from which mode of treatment Pasteur's method differs widely; but so far, the results of serum therapy have not been encouraging.

TETANUS

THIS is a disease the diagnosis and treatment of which usually fall to the lot of the surgeon. Recent investigations, however, have tended to show that the malady may be due to the influence of a specific micro-organism, the tetanus bacillus, in addition to which the disease may prevail epidemically and independently of injury ; for these reasons, therefore, a short account of the malady is here given.

An incubative period, which may be as short as a few hours or as long as nine or ten days, precedes the onset of tetanus. As a rule, the symptoms generally commence within a fortnight of the receipt of injury, in cases in which the disease is due to traumatic causes. The wound may look in all respects healthy, or, more frequently, may present an abnormal appearance. At the outset of the disease the patient often complains of feelings of cold or chilliness, and may shiver. At the same time, or shortly afterwards, pain and stiffness are complained of in the back of the neck, and especially in the muscles moving the lower jaw. When there is inability to open the jaw the term *trismus* is applied. Very soon the whole muscular system becomes affected with tonic spasm. This spasm is liable to be greatly aggravated by what are apparently most trifling causes ; a sudden sound, the slamming of a door, a draught of cold air, may each and all cause the greatest increase in the intensity of the symptoms. And these paroxysms have a tendency to supervene from time to time even in the absence of all irritation. When these attacks occur, the body of the patient may be bent backwards into the form of an arch,

being supported entirely by the head and heels. The muscles are firmly contracted and hard ; in some cases the spasm is so violent as actually to break the muscular fibres. This has been observed in the recti muscles of the abdomen. In other cases the bending of the body is to one side, and to this condition the term *pleurosthotonos* is applied. Similarly, the spasm may cause the bending forward of the patient, and then *emprosthotonos* is said to be present. The most intense pain accompanies these spasms, and the respiratory muscles are often involved, so that the breathing becomes seriously embarrassed. Indeed, if the spasms do not yield, asphyxia may be induced. During the act of deglutition these violent attacks may be excited, and in many cases swallowing is impossible, owing to spasm of the muscles of the gullet. The intellect remains clear throughout.

It must not be supposed that between the attacks the muscles recover their normal condition. This is very far from being the case ; the muscular tonic spasm persists, but is less intense.

The temperature in tetanus is often raised, and may be very considerably so, such temperatures as 104°, 105°, or 106° being not infrequently recorded. But in other cases there is very slight elevation of the body heat, and the disease may be apyrexial throughout. The contraction of the facial muscles is sometimes very marked during the paroxysm. The expression of face caused by this spasm has been described as the *risus sardonicus*. In many cases the power of speech is lost, owing to the spasm of the muscles involved in its production. Profuse sweating is often a marked feature of the malady. Many patients die exhausted by the violence of the paroxysms. In others death may be due to asphyxia, or to syncope.

Tetanus is a most fatal disease, especially when consecutive to injury. The mortality may under these circumstances be as high as 80 per cent. The fatal event generally occurs

within ten days or a fortnight of the commencement of the disease, so that every day that the patient survives after this period tends to make his ultimate recovery more probable. Sometimes the malady assumes a chronic form, the prognosis of which is considerably more favourable than is that of the acute affection. The prognosis also depends largely upon how long a time has elapsed between the receipt of the wound and the commencement of symptoms. The longer this interval, the greater the hope of recovery.

The symptoms of tetanus differ from those of strychnine poisoning in the early involvement of the muscles of mastication in tetanus, and in the fact of the persistence of the spasm in the inter-paroxysmal period. The history also will be quite different in the two affections.

It has already been mentioned that a bacillus has been discovered in wounds occurring in patients who, subsequent to the injury, become the victims of tetanus. This bacillus appears to be present and to flourish in earth, and also in certain putrefying liquids. It had been for long a noticeable fact that injuries contaminated by garden earth were peculiarly liable to be followed by symptoms of tetanus, and by the discovery of this bacillus in the earth the reason of this curious relationship between earth contamination of wounds and tetanus has been made clear. The bacillus is but slightly motile, and resembles somewhat a hammer in appearance, owing to one end being enlarged by the presence of a spore. The latter is very resistant to heat, whereas the bacillus itself is easily killed by a high temperature. The bacillus is obligate anaërobic; it is harmless when fully exposed to fresh air, but when enclosed in a wound it rapidly develops virulent properties. For this reason it is that deep and punctured wounds are much more often followed by tetanus than those which are superficial, and thus exposed to free access of air. When introduced into a wound, the bacillus appears to have the power of generating a toxic substance, by the absorption of which the symptoms are caused. The bacillus itself

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remains local; it does not seem to pass into the blood stream, and is not therefore found in the kidneys, spleen, lungs, or other organs. A most virulent toxin has been isolated from the bacillus, very minute quantities of which cause death, with apparently some, if not all, of the symptoms of tetanus. It seems that by the injection of the blood serum of an animal protected by an attack of the disease, immunity can be conferred, but the results hitherto obtained are not absolutely conclusive. The toxin of the disease appears to have a special predilection for the nervous system, and it is stated that the results of serum therapy are more satisfactory when the protective injection is made direct into the nervous centres. The disease is certainly epidemic, and, as already mentioned, it may occur in the absence of all evidence of injury. It is most often met with under the latter circumstances in hot climates, and in some parts of the tropics the disease is very fatal to new-born children. In this case the malady is known as *tetanus neonatorum*. Tetanus is not confined to man. Animals, and especially horses, are subject to the disease.

The morbid appearances are by no means characteristic. Congestion and commencing inflammatory changes are observed in certain parts of the brain and spinal cord, and the lesions met with in peripheral neuritis may sometimes also be encountered.

Treatment.

Immediate attention should be bestowed upon the wound, if such exists. Its excision or cauterisation, or both, are imperatively necessary. Every effort must be made to avoid the occurrence of the paroxysms by keeping the patient in a dark room, and by excluding every possible source of irritation. The food should be in the fluid form and highly nutritious, and stimulants will be necessary. If, as is often the case, the patient is unable to swallow, rectal feeding must be resorted to, or the nose-tube made use of.

Of drugs, large doses of chloral and bromide of potash are the most useful, and morphia hypodermically

may be necessary in order to soothe the patient's sufferings. Physostigma is sometimes employed, but with doubtful success. The results obtained by serum therapy up to the present time cannot be described as encouraging, though possibly increasing experience of this mode of treating the disease may lead to more satisfactory results. The serum used is that obtained from an animal rendered immune to the disease, and the rationale of the treatment is practically the same as the antitoxin method of treating diphtheria. Iodoform by the mouth, or preferably hypodermically, in doses of three or four grains several times a day, is said in some cases to have given good results.

DIVISION II

DISEASES OF THE HEART AND VESSELS

THE PULSE

It is not possible to over-estimate the importance which attaches to the investigation of the radial pulse, and this not merely as regards the heart and vessels, but also as concerns the system generally. The pulse in the adult beats at about 72 to the minute, while in the new-born infant it may be that the beats are as many as 130 in the minute. But as age advances the pulse rate tends to fall, until full growth is attained. Undue rapidity of pulse, *tachycardia*, is of less importance than are other alterations of the same. Undue rapidity may be caused by nervousness, by excitement, or by over-smoking, and is in some cases really an individual idiosyncrasy; it may also be a prominent symptom of certain diseases, such as exophthalmic goitre or anæmia. In many diseases of the heart itself, and in all febrile conditions, tachycardia is a marked symptom. More significant, speaking generally, of serious disease is abnormal slowness of the heart's action. This morbid condition known as *bradycardia*, when well marked, practically always indicates serious lesion either of the heart itself or of the nervous system. Thus in some serious diseases of the heart wall bradycardia may be the only evidence of anything being wrong, and this for some time before other symptoms, such as syncope, develop; or extreme slowness of pulse may be met with in cerebral disease, such as tumour, or in meningitis. Pressure, again, upon the pneumogastric nerve may give rise to the same physical sign. The pulse may in extreme cases fall to 40, 30, or even 20 beats in the minute.

In all such cases the danger to life is great, and death generally ensues from syncope, or in an attack of convul-

sions. But, just as in the case of tachycardia, there are instances from time to time met with in which the pulse rate is naturally slow from individual idiosyncrasy, and then bradycardia, within moderate limits, is without pathological significance.

The condition of the pulse as to its *rhythm* is an extremely important one. In health the rhythm is always the same; one beat follows another at precisely the same interval, and one beat exactly resembles another as regards its force and volume. Disturbance of rhythm may occur in two ways, each of which may be present separately, or they may be combined. In the first case, a beat is dropped at regular intervals, it may be the tenth, fifteenth, or indeed any pulsation which is thus missing. The dropping of the beat may be perfectly obvious to the patient through the occurrence of a throb or abortive heart beat. To this dropping of a beat the term *intermission* is applied. Intermission is the least serious of the disturbances of the heart rhythm. Very often indeed it is due to dyspepsia, and especially to the form of indigestion which is so often associated with flatulence as its chief symptom. It may, too, be due to over-smoking or the abuse of tea, coffee, or alcohol.

Much more serious is the other alteration of cardiac rhythm, to which the term *irregularity* is applied. In this condition successive beats differ in their force and in the period of time at which they occur. A strong beat may alternate with a weak one, or large numbers of irregular, weak pulsations may be interpolated, as it were, between several strong ones. Hurried pulsations may quickly follow one another, and then no pulsation, or but a few very feeble strokes, are felt. In extreme irregularity, such as accompanies late stages of dilatation of the heart cavities, a condition known in France as *asystolie*, all rhythm of every kind is lost, it being impossible to count the pulse on account of its excessively disorderly action. Irregularity of pulse points to organic

disease of the heart, generally due to affections of the valves, which causes dilatation of the cavities of the organ, and the so-called "loss of compensation," but which may also arise from degenerative changes of the cardiac wall, and independently of valvular lesion.

Next in importance, though hardly less in significance, comes the condition of the pulse as regards its power of resisting the pressure of the examining finger. Most valuable information on this point may be gained by placing the tips of the first, second, and third fingers upon the radial artery, and pressing upon the vessel with the second and third finger, while the forefinger gauges the effect of this pressure upon the portion of the artery which lies immediately beneath it. In this way the force of the pulse, whether strong or weak, is accurately estimated. In continued fever it is found that the least pressure of the tip of the second and third finger will entirely cut off the pulsation from beneath the forefinger, while in chronic renal disease very firm pressure of the first-mentioned fingers may scarcely suffice to obliterate the pulse beneath the first finger. In the former case the pulse is said to be *compressible*, in the latter *incompressible*. In the one case, the ventricular contraction is weak and the tension of the arteries low; in the other, these conditions are the exact opposite, being respectively strong and high. The pulse may be of large *volume*; that is to say, it may be full and bounding under the finger, and yet of very low compressibility or tension. This is often observed in the course of fevers; in febrile conditions, when the tension is decidedly low, it is not unusual to meet with a second or *dicrotic* beat, immediately after the pulsation of the artery, and which is due to a second rise of limited extent which interrupts the down stroke.

Dicrotism is always indicative of low tension or marked compressibility of pulse, together with a short, weak ventricular contraction. It is constantly observed in the

second and third weeks of enteric fever, and always suggests the use of stimulants in considerable quantity.

All the different varieties of pulse just described may be graphically studied by means of the *sphygmograph*, but it is a great mistake to place any special reliance upon this instrument as a guide to the condition of the heart and vascular system generally. It is of the greatest importance for the student to study the variations of the pulse in a very large number of cases, both in the wards and out-patient room; for it is not possible, without extensive practice, to gain that acquaintance with the innumerable gradations and shades distinguishing the indications of the pulse which it is absolutely necessary for him to acquire in order that he may be in a position to make accurate diagnosis.

It may be useful for him to compare the results obtained by the finger with those yielded by the sphygmograph, if for no other reason than to convince him of the uselessness of that instrument. He may also learn something as to the degree of incompressibility of the renal pulse by comparing the sensation communicated to his fingers with the round-topped graphic tracing, the ability to produce which is perhaps the one useful feature of the application of the sphygmograph.

In concluding these remarks on the examination of the pulse, we wish to emphasise the importance of determining in every case the condition of the arterial wall. This is easily done by rolling the vessel under the fingers. In health very little will be felt, owing to the elasticity of the wall of the artery; but when the latter is degenerate and atheromatous, it may be possible to feel the vessel revolve under the fingers like a piece of string or whipcord, it being at the same time roughened in outline and twisted or sinuous in its course.

POSITION OF THE HEART

It will be remembered that the apex of the heart beats in the fifth interspace, and just internal to the nipple line. Great variations, however, exist with regard both to the position and force of the apex beat, even within the limits of health. In children, especially, the apex beat may be localised in or beyond the nipple line, and yet the heart may be in all respects sound. In some people, too, it is not at all easy to define the exact position of the apex beat, and yet no morbid condition of the heart may exist.

It is useless to attempt to define by percussion that portion of the heart's dulness which is damped by lung. The so-called "deep" dulness is a figment of the brain of enthusiastic observers ; it is impossible to define it with any approach to accuracy, and its very existence is more or less problematical. Far otherwise is it with the "superficial" dulness, that, namely, which is due to the recession of the left lung, by which a small triangular interval, corresponding to the front of the right ventricle, is left uncovered. The area of triangular dulness may be easily determined as follows: Define the lower border of the junction of the fourth left costal cartilage and sternum, draw a line thence to the apex beat ; let fall a perpendicular from the point first determined, which will, of course, correspond with the left edge of the sternum, and join this to the point where the apex beats by a horizontal line. The triangle thus defined is the area of superficial dulness. It should not transgress the left edge of the sternum to the right, nor the normal position of the apex beat to the left. Its measurement horizontally varies considerably within the limits of health, but may be said, on the average, to be

about two inches; in morbid conditions it may extend to the right border of the sternum, and, indeed, considerably beyond this line. It must be borne in mind that an increase of this dulness to the right does not necessarily imply an increased size of the right ventricle. The abnormal dulness may be due to the increased area occupied by the enlarged left ventricle displacing the right side of the organ to the right; or the whole heart, itself perfectly healthy, may be pushed over by an effusion into the left pleural cavity. Epigastric pulsation is not uncommonly noticed. It is not seldom met with in cases of dilatation of the cavities of the right heart, by which they come to occupy an abnormal position in the epigastric region; but, on the other hand, it is certainly sometimes observed in perfect health when the action of the heart is unduly rapid and forcible.

An undulating line of dilated capillaries may occasionally be evident on the cutaneous surface at the point where the diaphragm is attached to the chest wall. This so-called "mapping" of the diaphragm is occasionally noticed where there is some yielding of the right ventricle, often due to bronchitis and emphysema causing a hindrance to the pulmonary circulation. It is, however, met with apart from this condition of the right side of the heart, and cannot, therefore, be regarded as an unequivocal evidence of cardiac disease.

DISEASE AFFECTING THE VALVES OF THE HEART

IN considering the symptoms of heart disease, it is necessary to divide the subject into diseases of the valves, of the pericardium and of the muscular wall of the heart, and of the vessels. By far the larger number of cases of heart disease depend upon morbid conditions of the valves, and for this reason we will commence the subject with the consideration of valvular disease.

The valves of the left side of the heart are those mainly affected; the tricuspid is but rarely involved, and still less often the pulmonary, except as the result of congenital disease. It may be stated at the outset that the symptoms of acute inflammation of valves are almost entirely included in those of the disease upon which such inflammation depends. In acute rheumatism, by far the most usual cause of inflammation of valves, there are no special symptoms which enable us to say that the heart structures are affected. Pain is not generally complained of; the pulse is quickened, it is true, but it is difficult in such cases to eliminate the effect of the fever which is always present. In the same way, as regards old damage to valves—damage which has in all probability resulted from acute rheumatism suffered from previously—so long as the heart muscle hypertrophies in order to compensate for the valvular defect, no symptoms arise. Sooner or later, however, and sooner in those whose life is one of daily toil, the muscular tissue of the heart begins to give way. The compensation commences to fail, and immediately symptoms of heart disease appear. Slight shortness of breath is complained of, especially on exertion; the lower extremities

Symptoms.

are noticed to be a little swollen, chiefly about the ankles, and towards evening. Both of these symptoms tend to increase, slowly or rapidly, according to circumstances; and in addition, others are added. Those affecting the lungs are very important; these organs become œdematous, and effusions may occur into the pleural cavities. The liver enlarges, and slight jaundice, chiefly of the upper part of the body, occurs. Ascitic effusion may ensue. The urine becomes scanty, high coloured, and albuminous. All these troubles increase, and the patient cannot lie down in bed; he dies at last from exhaustion, from slow asphyxia, or from some intercurrent affection of organs, such as pneumonia. It is of the first importance that the student has a clear understanding of what is meant by the word *compensation*, and to clearly comprehend that, so long as the compensation is perfect, no symptoms manifest themselves. This matter is referred to later, but its bearing upon treatment is too obvious to call for remark.

We must now consider the physical signs which are characteristic of the different affections of the several valves. To commence with the valve most frequently involved, viz., the mitral; the most usual of all valve disease is mitral regurgitation. If compensation is good, on inspection probably the apex will be found displaced outwards, but in its proper intercostal space. Palpation will prove the presence of hypertrophy of the left ventricle, the impulse being more or less unduly forcible or heaving; percussion will very possibly show that the dulness is increased to the left, and possibly also towards the right. Should the latter increase be marked, it must not be concluded that the right side of the heart is necessarily increased in size. Very frequently the increased dulness to the right is due to the hypertrophy of the left side forcing the heart more to the right than is normal. On auscultation a systolic murmur will be heard; this may merely accompany the first sound, or may entirely replace it. The murmur is conducted round into the

axilla, and is usually distinctly audible at the angle of the left scapula. When compensation has failed, the action of the heart becomes irregular; successive beats are not equal in force; the rhythm is lost, and many contractions of the ventricle do not reach the radial pulse. On auscultation the murmur is found to vary with the force of the ventricular contraction, being now loud, again almost inaudible. The second sound (pulmonary), which was formerly clearly defined, or even accentuated, becomes weak and feeble. The first sound of the heart loses its characteristic qualities; it becomes wanting in muscularity, valve-like, and indeed closely resembles the second sound. In advanced cases the two sounds are represented by a sort of *tick-tack*, and the murmur may entirely disappear. The face is often cyanosed, and the external jugular veins may stand out prominently and be observed to pulsate, the current in them being reversed. A loud systolic murmur may develop at the tricuspid orifice, the liver may enlarge, and even pulsate, and general œdema may ensue.

The next disease of the mitral valve demanding attention is that in which the orifice of the valve is narrowed, and its cusps thickened. To this affection the term mitral stenosis is applied. The cusps of the valves in this condition are welded together, and are often greatly thickened and more or less rigid. The result is that the mitral orifice is reduced in size; it may be to such an extent that the tip of the little finger can scarcely be admitted. Naturally, the passage of the blood from auricle to ventricle being impeded, the auricle becomes over-distended, while the ventricle is less freely filled than it should be. As a rule, in this condition, pure and simple, inspection and palpation do not give evidence of much hypertrophy of the ventricle, but palpation proves the presence of a thrill, which is usually distinctly pre-systolic in rhythm, *i.e.*, it immediately precedes and runs up to the systole. This is a perfectly characteristic phenomenon, and it should be borne in mind that the conditions which cause the thrill are precisely

those which give rise to the murmur. In other words, that which is heard as a murmur is felt by the hand as a vibration. On auscultation a very characteristic murmur is audible; not soft and blowing, like that of mitral reflux, it is, on the contrary, harsh, and ends abruptly with the first sound. It begins more or less faintly, but rapidly increases in loudness, until the maximum is obtained; it then ceases abruptly. As regards the diastolic silence, the murmur is in most cases truly pre-systolic, *i.e.*, is heard at the end of that silence. But cases occur in which this is not always so; the cause is the same, but the murmur, instead of being pre-systolic, is heard immediately after the second sound, *i.e.*, it is audible at the commencement instead of the end of the diastolic interval. In other cases, again, it may be placed, so to speak, in the middle of the diastolic silence.

Nothing but practice will familiarise the student with the different varieties of the pre-systolic murmur. There are one or two peculiarities about the murmur with which it is important to be acquainted; in the first place, it is a fugitive murmur. Heard distinctly one day, it may be inaudible the next. Secondly, in site it is much localised; as a rule, it is heard just inside the apex beat over a very small area; in this restricted area it is very distinctly audible, but for a short distance on either side only, and beyond these points it is not to be heard. Thirdly, there is nearly always in cases of mitral stenosis a reduplication of the second sound; the two elements of which the normal second sound is composed, instead of acting synchronously, do so one after the other. The result is this reduplication, which may be regarded as an important diagnostic physical sign.

Such are the signs of mitral stenosis. But it must never be forgotten that it is rare to meet with instances in which mitral stenosis alone is present; nearly all cases of this lesion are accompanied by a certain degree of incompetence of the mitral valve.

Hence, in addition to the murmur above described, a systolic murmur is nearly always audible. In advanced stages of mitral stenosis nothing is more common than for the pre-systolic murmur to disappear, the murmur of regurgitation alone persisting. In such conditions the presence of the mitral contraction may be entirely overlooked, and the case diagnosed as one of mitral reflux merely. It would appear that for the production of the mitral pre-systolic murmur a certain amount of force on the part of the ventricular and auricular contractions is necessary, and if this is absent, as in advanced stages of the disease, the murmur characteristic of stenosis disappears.

We pass on now to consider the diseases of the aortic valves. The most common, and by far the most important, lesion of these valves is that causing incompetence of the aortic cusps. As a result of this incompetence, the blood, during the diastole, runs back into the left ventricle, and the aorta is imperfectly filled. It will be readily understood that this back-flow into the left ventricle must cause a chronic overfilling of this cavity, and in order to compensate for the increased amount of work thrown upon it, the left ventricle hypertrophies. On inspection and palpation the left apex is found considerably, and it may be greatly, displaced to the left, and downwards, even in the sixth interspace and three inches to the left. At the same time, the heaving character of the impulse is extremely marked. The first sound is of that quality associated with great hypertrophy of the ventricle ; it is prolonged and booming. At the base, and particularly over the second left interspace close to the sternum, the characteristic murmur is heard in its greatest intensity. It is diastolic in rhythm, accompanying or replacing the second sound, and is conducted down the sternum. It is heard very loudly, sometimes more so than in any other spot, about the middle of the sternum over the right ventricle. It is generally taught that the diastolic aortic murmur is heard most loudly over the second right interspace, close to the sternum ; but this

is a complete mistake. Nearly all aortic regurgitant murmurs, though undoubtedly audible in the spot referred to, are loudest over the mid-sternal region, and are almost always much louder over the second left interspace at the junction with the sternum than in the locality usually indicated in the text-books. This is an important point, and should be carefully noted by the student. Some of these murmurs are extremely difficult to hear, and are often overlooked except by the finest auscultators. Indeed, the ability to distinguish the less obvious of aortic reflux murmurs may be taken as an index of the proficiency of the auscultator. No murmur varies more in loudness and in pitch than does that of aortic reflux; it may be so obvious as to be unmistakable. On the other hand, it is sometimes so soft and faint that only a skilled ear can detect it. It is of the utmost importance for the student to thoroughly study this murmur in its various manifestations; this can only be done by the examination of large numbers of patients, and by constant application. The pulse which accompanies the murmur is somewhat characteristic. As the ventricle contracts abruptly, and very forcibly, the aorta is suddenly expanded, but the tension is not maintained, owing to the back-flow into the ventricle. This result is reflected in the pulse, which is sudden and forcible, but is not sustained, for almost instantly it is felt to collapse and fall away from the finger. The characteristic quality of the pulse is more obvious if the arm of the patient be raised above his head. A sphygmographic tracing shows these different features well. This is the "water-hammer pulse," "the pulse of Corrigan"; too much importance should not, however, be attached to this form of pulse, for it is certain that cases occur in which the same qualities are by no means wanting in perfectly healthy conditions.

The only remaining lesion of the aortic valves is that due to thickening, and which therefore causes obstruction to the onward progress of the blood into the aorta. This condition is of quite frequent occurrence in connection with incompet-

ence of the valves ; they are both thickened and incompetent. By itself, and apart from regurgitation, it is perhaps the rarest of all murmurs affecting the left side, and hence it must not be diagnosed as a substantive and single lesion (that of obstruction without regurgitation) unless the following conditions are satisfied :—(1) The presence of hypertrophy of the left ventricle ; (2) a loud systolic murmur audible over the second right interspace, and conducted upwards towards the right clavicle ; (3) a distinct systolic thrill perceptible when the hand is placed over the area just indicated. It is of the utmost importance that these conditions be observed, as nothing is more common than for systolic murmurs to be audible at the base of the heart, which are very liable to be wrongly interpreted. When the obstructive condition is combined, as is so commonly the case, with regurgitant disease, then a systolic murmur is present along with a diastolic murmur ; in other words, there is a double murmur developed at the aortic orifice.

The tricuspid valve is far less frequently the seat of inflammation than the mitral, and when it is affected it is almost always so as the result of septic processes leading to the absorption of the poison in cases of pyæmia, septicæmia, or malignant endocarditis, and consequent contamination of the blood stream. Apart from this mode of causation, endocarditis affecting the tricuspid valve is occasionally, but only rarely, found to be present in cases of chorea ; and, in conjunction with disease of the mitral valve, is sometimes met with in acute rheumatism. It is quite as usual to meet with tricuspid stenosis as with incompetence of the same valve due to inflammatory changes. Tricuspid incompetence is generally met only as the final result of mitral lesion, due to inflammation or to chronic renal disease, and it may also arise in cases of chronic bronchitis and emphysema, from the increased strain thrown upon the right heart ; the compensation being lost, the undue strain on the right heart leads to dilatation of the same, the result being that the three cusps no longer meet, although themselves

perfectly healthy. The physical signs and symptoms of this condition are, of course, those already detailed as characteristic of the later stages of uncompensated mitral disease, and reference has already been made to the fact of the murmur of tricuspid regurgitation being loudly audible over the right ventricle. The cardiac dulness, too, will be found greatly increased to the right, extending, it may be, an inch or more beyond the right border of the sternum. Associated with these physical signs, the external jugular veins are frequently greatly dilated, are observed to pulsate, and are found to fill up from below.

Inflammation of the pulmonary valves is met with almost exclusively in septic conditions, other organic changes in the same being due to congenital defects. A loud systolic murmur audible over the second left interspace and close to the sternum, together with a thrill on palpation, and evidence of a large right ventricle, would form satisfactory evidence of a stenosed pulmonary orifice; and the same condition, together with a diastolic murmur, would point to pulmonary regurgitation. No murmur is more common than the systolic heard over the pulmonary area, and it is entirely unconnected with disease of the valve, being due to blood conditions associated with anæmia; but as an evidence of organic disease of the valve, its presence is practically confined to cases of congenital narrowing of the pulmonary aperture. Pulmonary regurgitation is due to the same cause, and is of extreme rarity.

Cases occur in which fever and a newly-developed murmur appear together. When this happens, it is quite impossible at first to be certain that the case is not one of ulcerative endocarditis; it is only by following the case that the two diseases, simple and malignant endocarditis, are to be differentiated. Enlargement of the spleen is in favour of the malignant form of the disease being under observation.

Mention should be made of the significance of the loudness of a murmur. As a rule, the louder the murmur the better is the prognosis. A loud murmur indicates a strong ventricular

contraction, and is therefore met with in cases in which the compensation is good. In aortic regurgitation the loudness of the murmur is a particularly favourable sign, though often regarded in quite the opposite sense. Those cases of aortic regurgitation in which the murmur is soft, faint, and difficult to hear are precisely those in which the cardiac action is feeble, and they are particularly liable to end in sudden death.

The chief aim in examining the heart is to ascertain its exact condition as regards the capacity and strength of its ventricles. It is of no use to detect and localise murmurs unless the consequences arising from the conditions upon which the murmurs depend are thoroughly understood. The discovery of a valve lesion is of course both interesting and important, but is in itself simply a means to an end, the latter being the determination of the physical condition of the heart cavities. When a leak in a valve exists by which the cavity behind the lesion is not properly emptied, Nature immediately endeavours to rectify the mischief through hypertrophy of the muscular walls of the cavity affected. Thus in aortic reflux the walls of the left ventricle undergo a great and very characteristic muscular enlargement. In the same manner, in the case of mitral reflux, the left auricle, in the first instance, endeavours to accommodate itself to the increased effort required of it; but as the walls of the auricle are thin and incapable of much increase in muscularity, the chief brunt of the burden is borne by the right ventricle, which in no long time itself undergoes the changes incident to hypertrophy. In this way a damaged valve may be but of slight importance to the life and health of the patient. This process of hypertrophy of cavities is known as *compensation*, and it is of the highest importance in a given case to ascertain if such compensation be present; and if so, its extent and probable duration. This, then, is the goal of all physical examination of the heart. In every case of valvular disease the tendency is, sooner or later, for com-

pensation to fail, and it matters not whether the affection, in the first instance, involved the aortic or mitral valves. The hypertrophy of aortic disease, as just mentioned, is a conservative effort of Nature to annul the evil effects of the lesion, but this hypertrophy does not last; and, especially if the patient be unfavourably situated as regards his employment and surroundings, hypertrophy gives way to dilatation. When this happens, even if no mitral murmur existed before, such a morbid sound soon develops, not from any disease of the valve, but because the increased size of the ventricle no longer allows the mitral cusps to meet. So that, in the long run, the end is the same, viz., loss of compensation and consequent over-filling of the venous, with under-filling of the arterial, system.

The question of the efficacy and duration of the compensation depends to a very large extent upon the vocation of the patient and his position in life. It stands to reason that when placed in favourable circumstances, and in an easy financial position, his chances are much better than when these conditions are reversed, and for this reason the prognosis of valve disease is far more favourable in private than in hospital practice. Excluding all considerations except those which concern the disease itself, it certainly seems that, with the exception of the possibility of sudden death from over-filling and consequent paralysis of the ventricle, reflux aortic disease is a less serious lesion than the same affection of the mitral valve; and of disease of the latter, stenosis is a far more grave affection than incompetence. The reason of this is, of course, obvious; the great ventricular hypertrophy in aortic regurgitation tends to neutralise the evil effect of the leak through the valve, but in the case of mitral stenosis there is only the thin wall of the left auricle to overcome the obstruction at the mitral orifice; for the weakness of the auricular cavity is such that, at a very early stage of the disease, it greatly dilates and becomes chronically overfull. The result is that engorgement of the lungs speedily ensues, and everything

then depends upon the ability of the right ventricle to propel the blood through the pulmonary organs. But the powers of the right ventricle are limited, and sooner or later it, too, dilates, when all the symptoms characteristic of loss of compensation do not delay their appearance. In the case of mitral reflux, the lesion is less serious, inasmuch as only a portion of blood gains the left auricle during systole, and hypertrophy of the auricle overcomes to some extent the strain thrown upon it, which arises from its repletion; still, in both lesions, stenosis and regurgitation, the evil influence is the same, and the difference in its effects is one of degree only.

When a very marked hypertrophy, shown by a heaving impulse and displacement outwards and downwards of the apex, exists, especially when associated with obvious beating of the arteries in the neck and elsewhere, and with a water-hammer pulse, there can be little doubt that, whatever other lesion there may be, aortic regurgitation is present. On the other hand, in mitral stenosis the presence of a thrill, of a reduplicated second sound, and of a pre-systolic murmur, will make the diagnosis easy; in this case the left auricle is greatly dilated and the left ventricle small; it may be extremely reduced in size. The ventricle is, as it were, under-fed, for the oxygenated blood can only with difficulty obtain access to its cavity. Very often in mitral reflux, pure and simple, no obvious displacement of the apex is present, at least in adults, but in children it may be considerable in this lesion. In all cases, in them, no matter what may be the nature of the valve affection, there is frequently observed a bulging of the pre-cordial region, due to the soft and yielding chest wall giving way before the enlarged heart.

By far the most frequent cause of endocarditis is acute rheumatism. This disease, as an etiological factor of endocarditis, outweighs in importance all other causes put together. Endocarditis may also be due to the poison of specific fevers, such as variola, scarlatina, etc.; in rare

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cases it has occurred as a complication of pneumonia or diphtheria. In its malignant form it is sometimes seen in cases of septicæmia and pyæmia. In these maladies it is the endocardium of the right side that is especially liable to be affected. Chronic renal disease may be the cause of endocarditis; and it may occur also in connection with gout, especially with the more chronic forms of the affection. Numerous bacilli have been found in the inflamed areas of this disease, but they are chiefly the streptococcus, the staphylococcus, etc.; more rarely organisms have been detected which have been considered as more or less *sui generis*, and the bacterium coli is sometimes also met with. It may be that these or other organisms have much to do with the causation of the disease; but, on the other hand, it is equally probable that they are merely attendants upon the morbid process, the real cause of which lies deeper, and at present eludes all our researches.

The portions of endocardium most apt to be involved are those covering the valve, and of these there are certain points of election which are invariably the seat of disease. As regards the mitral valve, it is the auricular aspect, just above the point of contact of the two cusps, where the chief morbid appearances are found in acute cases. In the aortic cusps it is the ventricular surface, immediately below the free edge of the cusps, and exactly at the point of contact of the latter in diastole. The student must remember the normal fenestration of the free edge of the cusps in order to avoid mistakes. But other portions of the endocardium may be inflamed, yet more rarely, the valves themselves being the seat of the inflammatory lesion in the large majority of cases. In recent endocarditis the usual appearances are a reddening and thickening of the affected valves in the situations mentioned, together with the presence of minute beads of fibrin deposited on their surface. In some cases large masses of granulations will be found attached to the valves, and sometimes the layers of

these structures become separated by the elevation of their epithelium, so that a hollow swelling is produced, the so-called "aneurysm" of the valve.

The morbid process is essentially an inflammation, and the changes consist in extravasation of leucocytes and the infiltration of the connective tissue with the latter, and with serous exudation. A marked tendency to contraction of the new form of tissue is unfortunately always present, with the result that shrinkage occurs where no shrinkage is allowable. The result is incompetence and rigidity of valves, and the consequent development of characteristic murmurs. In some cases the inflammatory process is so intense that loss of substance follows, or even perforation of the valve implicated. Such conditions will be again referred to under the head of malignant endocarditis. The thickened, roughened surface left by the inflammatory process is particularly apt to become the seat of subsequent fibrinous deposit from the blood stream. It is in this way that some of the so-called granulations may arise, and by subsequent detachment these masses of fibrin may lead to serious mischief from embolism in the brain, the peripheral vessels, or the lungs. The thickened, rigid valves may be rendered still more useless by a subsequent process of calcification, and it is not at all uncommon in old standing cases to find the affected valve of stony hardness from this cause.

It is very important to remember that a valve which has once been the seat of the inflammatory process is extremely apt to be again affected in a similar manner. And in this way repeated attacks of inflammation may lead to its practical destruction. It may be reduced to a mere stump or trace, and it is quite usual to find a thickened, chronically diseased valve the seat of an inflammatory process, bearing all the attributes of being both recent and acute.

So long as compensation remains good no special treatment is necessary, and drug administration is quite useless. Treatment.

A heart with a compensated valvular defect is in a certain sense a sound heart, and all we can or ought to do should be limited to cautioning the patient to avoid all those things which are likely to cause a breakdown of the compensation. It is not at all necessary for such a patient to lead the life of a valetudinarian; but he must stop short of fatigue in walking or riding. He should not take part in rough or exciting games, such as football; swimming and rowing should not be indulged in; cycling also is not to be permitted. Special care should be taken to see that adequate exercise is taken, and that the alimentary system is kept in good order. If common-sense rules be followed, the patient may live for years. We know of cases in which loud aortic regurgitant murmurs have persisted with excellent compensation for ten years or longer, and are at the present time in just as good condition as when first observed. It is obvious that in the labouring classes the outlook is far less satisfactory, hence in hospital patients the worst side of the subject of valvular disease is seen, and the student is perhaps too apt to get imbued with pessimistic ideas on the question of prognosis in heart disease.

But sooner or later in most cases of valve lesion a time comes when compensation begins to fail. This is generally shown by swelling of the legs in the evening, and slight shortness of breath. At this stage much may be done by treatment to arrest the progress of dilatation, and far above any drug treatment is the good effect of prolonged rest in bed. A patient put to bed and kept there for a month will often show extraordinary improvement. As almost invariably digitalis and other drugs are administered at the same time, it is generally assumed that this satisfactory result is due to the drug; but this is an entire mistake. We have seen exactly the same improvement in cases of failing compensation, when the patient has been kept for some time in bed, whether digitalis was given or omitted. There can be no doubt that digitalis has a beneficial action in certain cases of lost compensation, and the indications

for its use are particularly irregularity and rapidity of pulse, together with cyanosis, œdema of extremities and lungs, and shortness of breath. In some instances strophanthus seems to be more satisfactory than digitalis. In all cases of lost compensation it will be found that the liver is enlarged, and that very frequently the upper half of the body is slightly jaundiced. In such a condition the administration of a mercurial purge is often very beneficial, and, in fact, in all cases of failing compensation such a purge, repeated from time to time, is indicated. Citrate of caffein is sometimes useful in removing œdema and increasing the urinary flow; but it is an uncertain remedy, and often has no good result. There is one mode of treatment in advanced cases which is often very useful, viz., that by venesection.

For some reason this proceeding has fallen almost into desuetude; nevertheless, it is a most valuable resource in many cases, and as no harm can come of it, it should certainly be employed when a likelihood exists of its success. In many cases, however, a difficulty exists in the performance of the operation, for the blood is so thick and inspissated that it will not readily flow from the vein. Extreme cyanosis, pulsation of the external jugulars, excessive weakness of radial pulse and orthopnoea are the indications for bleeding, and when these symptoms exist the proceeding should not be delayed. Nature herself points the way, as is shown by the tendency to hæmorrhagic infarction of the lung, and also by the frequency with which hæmoptysis takes place, especially in cases of mitral stenosis. Should œdema of the lower extremities be marked, much relief will be obtained by the employment of Southey's tubes; and if ascites occurs, it may be necessary to resort to paracentesis abdominis. Care should also be taken to watch the pleural cavities, and in some cases aspiration of hydrothorax may be required. It is scarcely necessary to add that in the class of case under discussion stimulants are frequently desirable, and indeed necessary.

Sleepless and disturbed nights, with frightful dreams and terrors, are very usually complained of in cases of dilated heart. Nothing gives so much relief to these symptoms as hypodermic injections of morphia.

When in aortic disease anginal attacks occur, they may be relieved by those methods, *e.g.*, the inhalation of nitrite of amyl, which are so successful in cases of true angina pectoris. In all cases of valve disease care must be taken to avoid bronchitis and other pulmonary complications, the presence of which throws a further strain upon the already embarrassed heart.

MALIGNANT OR ULCERATIVE ENDOCARDITIS

THIS is a fatal disease, often of long duration, depending upon severe inflammation of the endocardium and sepsis, and often attended with development of numerous embolic infarctions.

The symptoms of malignant endocarditis are fever, those of valvular disease of the heart, and great prostration. Fever is an important and constant symptom. It is usually markedly remittent, and may be intermittent; there is a morning fall and an evening rise, often to two or three degrees above the morning temperature. Rigors may occur, and it is almost invariably the case that the spleen is enlarged. Here, then, is a group of symptoms remarkably resembling those of ague. There is no doubt that many cases of malignant endocarditis have been in the past, and still are, diagnosed as intermittent fever. As a rule, which is, however, by no means an invariable one, the invasion of the disease is gradual, and in most cases the patient is already the victim of valvular heart disease; very possibly at the beginning of the illness it seems as if he were again suffering from an attack of rheumatism. This is the more likely view to be taken if, as is sometimes the case, pain and swelling of joints are present. In no long time the patient passes into a condition of gradual prostration; he lies in bed on his back, has an anæmic appearance, and seems to be somewhat short of breath. Physical examination reveals lesion of cardiac valves, and any of the ordinary murmurs may be present; very often new ones appear in the course of the disease. The spleen is almost always enlarged, and this enlargement should invariably be sought for, its presence being of great

assistance in the diagnosis of the affection. The pulse is soft, compressible, and rapid. Sweating is very common. Not seldom during the progress of the malady hemiplegia occurs, and is usually on the right side, and accompanied with more or less aphasia. It is, of course, due to embolism, a portion of fibrin being washed off a diseased valve and borne along by the blood stream to its resting-place in the cerebral artery. Infarction of the spleen is also of common occurrence, and may lead to enlargement of the organ; in such cases there is often sudden pain and tenderness in the splenic region, with rapid enlargement of the gland, and possibly marked exacerbation of the febrile symptoms.

A symptom sometimes met with is an erythematous rash on the trunk or extremities, which is generally evanescent, but may recur from time to time in the course of the disease. Purpuric rashes may also appear in this malady, and there may be hæmorrhages from the different orifices, of which hæmaturia is perhaps the most frequent. There is often albumen in the urine of patients suffering from malignant endocarditis, altogether apart from the occurrence of hæmaturia. Sudden dimness of sight, due to hæmorrhagic retinitis, may be complained of. Bronchitis and pneumonia are quite usual complications, and not infrequently tend to a fatal result. A cardiac murmur is not always present, for the heart sounds may be quite clear and apparently normal. In such cases, should embolic symptoms appear, the diagnosis is not quite easy; but the fact of the occurrence of symptoms of malignant endocarditis unaccompanied by physical signs of valve disease is an important one, and should not be lost sight of.

The course of the disease is often a long one, and it may last for several months. The result is always fatal. Although usually prolonged, the duration of the disease is sometimes short, and death may occur within a few days of the commencement of symptoms. In such cases the fatal event often results from heart failure. We have seen

a case, accompanied with profuse diarrhoea, in which death occurred within three days of the patient being taken ill.

The resemblance of the symptoms of this disease to those of ague has been already referred to. We have known malignant endocarditis to have been treated with large doses of quinine, under the mistaken impression that the case was one of intermittent fever. It is needless to say that the drug was totally ineffective. It behoves the student to carefully avoid falling into this error, which is one often made; ague is a disease very seldom met with in London hospitals, except in the case of those who have lived in the tropics, so that the history is a very important item in the diagnosis. Some cases of the malady present a remarkable resemblance to typhoid fever, especially when diarrhoea is present. In such cases the enlargement of the spleen, in conjunction with the other symptoms, is very likely to lead to this error in diagnosis being made. Malignant endocarditis has again frequently been mistaken for chronic septicæmia. Certainly the symptoms of the two affections are much alike, but careful attention will render the danger of confusion small. In septicæmia there is generally an injury or some surgical condition present, and there is not the same tendency for the valves of the heart to be affected, though this may, of course, occur in blood poisoning. Further, it must be borne in mind that malignant endocarditis is itself, in a sense, a form of septicæmia, and that the latter condition may arise in the case of a person already the victim of valve disease. It may be stated, in general terms, that when a patient presents himself who has never been in the tropics, who is not suffering from injury, and in whom intermittent fever, an organic heart murmur, and an enlarged spleen are present, the disease is malignant endocarditis, and no other.

It must not be supposed that malignant endocarditis is by any means a rare disease. This is certainly not the case, and the malady is frequently met with in hospital practice.

The following case illustrates in a remarkably clear manner the rapid course and sudden onset of some types of ulcerative endocarditis; the symptoms throughout were those of meningitis, and the history shows most convincingly that a heart murmur may be absent from first to last in spite of the existence of severe endocardial lesion. The rapid production of cutaneous hæmorrhage is noticeable, and proves the existence of profound blood changes.

The patient was a girl of twelve; her previous health had always been good, with the exception of "fits" at ten months old, and occasional "growing pains" at a later date. A year and a half before admission she suffered from an attack of chorea lasting two months. From that time until six weeks before admission she was in good health. Then the choreic movements recurred, but were not very marked, and she did not take to bed. Except for the movements, she was in her usual good health until July 20, when, on returning from walking, she complained of her legs feeling weak. The next day there was severe pain in the head and feverishness, and she was sick three times. In the evening she became unconscious and delirious, and some twitching of the legs was observed. Neither squinting nor convulsions were noticed. The temperature was said to have been 105°. There was no sore throat and no back pain.

On admission to hospital the child was semi-conscious. The pulse was 132 and regular; the pupils were small, equal, and reacted to light; the head was not retracted, and there was no rash. Nothing abnormal was found in the condition of heart, lungs, or abdomen. The child remained in the same semi-conscious condition, and the next day the spleen was found to be enlarged. On August 1 the eyes were examined with the ophthalmoscope; optic neuritis was not detected. On this day a few red spots on face, abdomen, and legs were noticed, and some of them were observed to be pustular in the

centre. On August 2 the rash was much more developed, but of the same character. One subcutaneous hæmorrhage was observed over the sacrum. The next day the child was quite unconscious, and the temperature rose in the morning to 105·8. A large extravasation was noticed over the upper and outer portion of the left thigh, and another appeared over the left instep. No heart murmur was present throughout the course of the illness, which terminated fatally on August 3, just seven days from the commencement of symptoms.

The post-mortem examination revealed the existence of malignant endocarditis, involving both the mitral and aortic valves. As far as could be ascertained from careful examination, there had been no antecedent heart affection, as the valves appeared to be perfectly healthy except as regards the recent lesion, and the heart cavities were not in the least degree enlarged. Numerous infarctions and hæmorrhages were present in the kidneys, and the spleen was greatly enlarged.

The most usual cause of malignant endocarditis is a previous inflammation of the lining membrane of the heart cavity, which is generally of rheumatic origin, but may have occurred in connection with scarlet fever or other specific febrile malady. There is a considerable body of evidence in favour of the disease being specific, and due to the ravages of a definite micro-organism, possibly the *streptococcus pyogenes*, but nothing certain is known on this point. Septic conditions, however induced, are more or less liable to be complicated with malignant endocarditis, especially when the endocardium is already damaged by a previous attack of inflammation. It may be said, speaking generally, that malignant endocarditis is not a primary but a secondary disease, probably arising from the effects of the micro-organism, or organisms, which have gained access to the blood stream.

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The chief seat of the morbid process is found in the endocardium covering the valves. The lesions are de-

structive; the exposed valve surface acting as a foreign body, fibrin is deposited on it. In this way large vegetations sometimes form, which may project downwards into the left ventricle from the aortic valve. In many cases the loss of substance in the eroded patch passes into perforation of the valve, and it is this tendency which has given rise to the term "ulcerative." But as deep ulceration does not by any means invariably occur, it is better to employ the term "malignant" instead of "ulcerative" to characterise the form of inflammation. Certain pathological microbes have been discovered in the ulcerated valves, and in the thrombi attached to them, as also in the blood stream, and in the spleen. They are probably nothing but saprophytes. The spleen is nearly always enlarged and generally soft, or even diffuent. Embolic infarctions, too, are frequently met with in the spleen, lung, and kidneys. The lungs may present the appearance due to pneumonic consolidation.

Treatment.

The treatment of malignant endocarditis is extremely unsatisfactory. There is no drug which has the slightest influence on the course of the disease, and death inevitably occurs sooner or later. All that can be done is to palliate the patient's sufferings by the administration of opium and morphia. If the temperature ranges high, tepid or cold sponging may be employed, and quinine in suitable doses administered. Stimulants are required in all cases.

PERICARDITIS

IN many cases of pericarditis the symptoms are neither numerous nor striking. It frequently occurs, together with endocarditis, in acute rheumatism, without the presence of any additional symptoms being noticed. On the other hand, the symptoms may be so severe as to be quite unmistakable, and of such a nature in some cases as even to suggest the possibility of the case being one of meningitis. Violent pain, high fever, and nervous disturbance may be so marked as to lead to the seat of the disease being entirely overlooked. Such forms of the malady are, however, rare, and most cases of pericarditis are characterised by symptoms which are simply those of the disease upon which inflammation of the pericardial serous membrane depends, namely, those of acute rheumatism. In the large majority of cases, pericarditis is accompanied with endocarditis, and it is quite impossible, unless considerable effusion occurs, to say how many and which of the symptoms are due to the exocardial inflammation *per se*. Symptoms. }

In most cases pericarditis is dry, with little or no fluid effusion; but lymph is thrown out, it may be in large quantities, whence the term *plastic* often used to describe this form of pericardial inflammation. When effusion in large quantity is present the case is different. Then the symptoms are well marked, consisting of dyspnœa, anxiety, and cyanosis. Pain is not usually complained of in this malady; still, it may be very severe. Fever, weakness, and acceleration of pulse, greatly increased rapidity of respiration, are all present.

In the early stages of pericarditis the physical signs are those due to the friction of the roughened

visceral and parietal pericardium. There is a to-and-fro sound accompanying both the systole and the diastole. This sound is audible over the whole precordial region, but the site of maximum intensity is always the base of the heart and the right edge of the sternum. Care must be taken not to confound a friction sound of another kind with that due to pericarditis. In pleuritis it is not at all uncommon for a friction sound, which has apparently the characters of pericarditis, to be audible. It is really due to the rubbing of the inflamed pleura against the neighbouring pericardium. As a rule, the diagnosis can be made by requesting the patient to hold his breath for a few seconds. If this is done, and the case is one of pericarditis, the morbid sounds undergo no change. On the other hand, should pleurisy be the cause, the sounds are either immediately silent, or at all events changed in character. Some cases of double aortic murmur bear a remarkable resemblance to the friction sounds of pericarditis. We have seen several cases in which the two conditions have been confounded. Careful attention to the other features of the illness, and its history, would prevent the possibility of error. When the sound is pericardial, it will often be much increased in intensity by slight pressure with a stethoscope.

Thus it will be seen that in the dry stages of pericarditis the physical signs are practically entirely auscultatory, although occasionally a friction fremitus may also be felt by the hand laid flat on the precordial region. When effusion occurs, however, the signs obtained by palpation and percussion become of great importance. In cases of effusion the apex of the heart is raised; it may be to such an extent that it is felt at the second interspace, the impulse at the same time being feeble and indistinct. When the effusion is very copious the apex beat may be wholly imperceptible. On percussion the area of dulness is greatly increased. Remembering the mode of attachment of the pericardium to the heart, and the relationship of the heart and the great vessels at its root, it is easy to

see that the area of dulness will be, speaking roughly, pear-shaped, with the base of the pear uppermost. The dulness is especially increased to the right and left, and may transgress the normal limits in each direction by many inches. At this stage the friction sound has entirely disappeared, and remains absent until absorption of the fluid allows the two inflamed surfaces to come in contact, wholly or partially, when the sound again appears. Return of the friction sound is a sure sign that such absorption of fluid is in progress, other evidence of the same absorption being diminution in the area of cardiac dulness, increased force of the apex beat, and greater loudness of the heart sounds, which, during the height of the effusion, are often much weakened. From pressure of the effusion on the left recurrent laryngeal nerve some impairment of speech may ensue, or even marked aphonia. Cyanosis may be marked in some cases of pericarditis, and the force of the pulse may be weakened during inspiration (*pulsus paradoxus*) when the effusion is large. The space occupied by the left lung may be greatly encroached upon; when this is the case care must be taken not to attribute the dulness to the presence of fluid in the pleural sac.

The most important results of pericarditis are, first, the adhesion of the two surfaces of the pericardium, leading to obliteration of its cavity; and second, weakness of the muscular wall of the heart consecutive to the myocarditis which invariably accompanies inflammation of the investing serous membrane.

There are no certain signs which can be relied upon in the diagnosis of adherent pericardium. It was formerly supposed that recession of the apex beat during systole was an unfailing sign of adhesion. This is altogether fallacious. We have many times seen cases in which the apex receded, drawing in the chest wall, at each systole, and in which, on post-mortem examination, the pericardium was not, and never had been, inflamed. We attach no importance to the presence of the *pulsus*

paradoxus (diminished force of the pulse, or entire absence of pulse beat during deep inspiration) which has been claimed as a diagnostic criterion of the presence of adhesion. The presence, with other physical signs of valve disease, of excessive cardiac dulness, is perhaps the most suggestive of all indications of adherent pericardium, but even this is by no means a certain guide.

It has already been mentioned that when pericarditis is present, inflammation of the heart muscle—myocarditis—is never absent. This is a most important consideration, and explains the unfavourable sequelæ of pericarditis, even when adhesion does not occur. The muscular wall of the heart is seriously weakened by the inflammation, and it is easy to understand that, under these circumstances, dilatation of the cavity of the organ may ensue.

In some cases effusion into the pericardial cavity becomes purulent. This occurs only in very serious cases, and especially in connection with septic conditions and empyema in children, and gives rise to what is known as pyo-pericardium. The physical signs do not differ in any way from those already described, but the general condition of the patient is extremely unsatisfactory. Great prostration, rigors, and characteristic septic temperature may co-exist; the prognosis in such conditions is extremely grave, and most cases terminate fatally.

It has been already mentioned that cerebral symptoms may be so marked a feature of the malady as to distract attention from the heart as the seat of disease. In such cases the temperature may be very high; indeed, hyperpyrexia may be present, and the most violent delirium ensue. The danger in this condition is very great; cases of this character are occasionally observed in connection with the hyperpyrexia which sometimes occurs in acute rheumatism.

The immediate prognosis in most cases of pericarditis with no fluid effusion, or in which the latter is very slight, is favourable. But this is not so as regards the remote

prognosis. To say nothing of the great probability of endocarditis, and therefore of valvular mischief being associated with the pericardial inflammation, the myocarditis which invariably accompanies pericarditis is almost certain to cause weakness and dilatation of the ventricular cavity, which will sooner or later lead to the development of symptoms of failure of compensation. And the fact of pericarditis having occurred renders a second attack very probable. In cases in which the effusion is very large and *à fortiori*, when it is purulent, the outlook is extremely gloomy.

By far the most frequent cause of pericarditis is acute rheumatism, yet in acute rheumatism pericarditis is much less frequently met with than endocarditis. Pericarditis may arise by extension of inflammation from the pleura. It may be due to tuberculosis, or to malignant disease affecting the heart and pericardium; both the latter forms of malady are very rare. There is a very slight tendency on the part of chronic renal disease to cause pericarditis; still, cases do arise from time to time, thus taking their origin. An important cause of pericarditis is the presence of an aneurysm affecting the origin of the aorta. This is but a little recognised form of the disease; however, it certainly occurs, and is no doubt due to the enlarged aorta within the pericardium acting as an irritant. It is important to remember this mode of causation in cases of pericarditis of obscure origin. Pericarditis, lastly, may be due to a direct injury, and is occasionally met with in septicæmia and pyæmia.

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The inflammation, like that of the pleura and of other serous membranes, is essentially of a croupous or plastic character. The superficial layer of epithelium is destroyed, and the surface, in consequence, loses its polish and becomes roughened. Inflammatory exudation is deposited, and so-called false membrane results. Microscopically this consists of an interlacing network of fibrin, between the meshes of which numerous cells, red corpuscles, and

leucocytes are enclosed. The inflammation may not progress further, and after a time the pericardial surfaces are then each faced with a layer of lymph which may be an eighth, a quarter, or even half an inch thick, and which, owing to the cardiac movement, often has a rippled surface, like the seashore when the tide has just left. The effusion is soft and sticky, and the two opposed surfaces are more or less adherent. In some cases the lymph assumes a shaggy appearance, being more plentifully deposited in one point than in another. This effusion of lymph tends to organise. It becomes converted into a fibrous tissue by means of which adhesion between the two surfaces is effected. Total obliteration of the pericardial cavity may ensue, and it may be that considerable force is required to separate the adherent surfaces. This adhesion may, however, be only partial, the two surfaces being united at certain points only. But the effusion is not always confined to the production of lymph. Fluid may be poured out, and may distend the pericardial sac. This fluid is in all respects similar to that which is found in cases of pleurisy with effusion; it is often yellowish or straw-coloured, and but rarely blood-stained, unless the cause of the pericarditis be malignant disease. In cases running a favourable course the fluid effusion is absorbed in process of time. The two opposed surfaces come together, and only too often adherent pericardium results. Only in rare cases, fortunately, does the effusion become purulent, and chiefly in those of septicæmia and pyæmia; this change is met with also in children in connection with empyema, and is then probably due to extension from the pleura. Pyo-pericardium is nearly always fatal.

In every case of pericarditis the underlying myocardium never escapes; myocarditis of the adjacent muscular layers results, and the fibres become the seat of degenerative processes, granular and fatty. It is due to the supervention of these degenerative changes that the weakness and dilatation of the heart ensue which are so common after attacks

of pericarditis, especially in those cases in which the action of the organ is further embarrassed by the injurious effects of adherent pericardium.

The patient must, of course, be put to bed and kept, as far as possible, in the horizontal position. It may be thought that to especially mention the necessity of patients being kept in bed is superfluous, as in acute rheumatism, which is by far the most frequent cause of pericarditis, the patient will certainly seek his bed of his own accord. This is, of course, true of older patients, but is not so of children. In them, as previously mentioned, the joint manifestations of acute rheumatism are often of the most trivial description, and far too frequently an inflamed endo- and pericardium is already developed while the child is up, about, and even at school. Treatment.

If pain is a prominent symptom, warmth in the shape of poultices or hot fomentations to the precordial region will often relieve it; or it may be alleviated by the application of a few leeches, or by blistering. This latter mode of treatment would be much more often made use of were it not that it leads to an impediment being placed in the way of daily examination of the precordial region, which is of such great importance in these cases. In treating the pericarditis of acute rheumatism, it is important to bear in mind the tendency of salicylate of soda to depress the action of an already enfeebled organ. Care must, therefore, be exercised in administering the drug, and the pulse must be closely watched. There is no medicine which has any specially beneficial effect on pericarditis. Iodide of potash has been recommended. Its value is extremely doubtful. Opium in some form will probably be required to procure sleep and to relieve pain, and hypodermic injection of morphia may be necessary. The bowels should be kept open; the diet should be fluid, chiefly milk, and stimulants should be administered if occasion require. In cases of excessive distension of the sac with fluid, and in those rare instances in which suppuration ensues, the question of

paracentesis must be considered. Such an operation should only be resorted to when absolutely necessary, and in order to save or prolong life; the results hitherto obtained are far from encouraging. It need scarcely be said that treatment in all cases of pericarditis due to malignant disease or to tuberculosis is absolutely unsuccessful, death inevitably ensuing when the disease originates in this manner.

FATTY DEGENERATION OF THE HEART

THIS form of cardiac disease is met with in persons of advancing years, those who have attained middle life and onwards. The liability to it steadily increases as age advances. Both sexes are equally liable to the incidence of this degeneration, and it is by no means more usual in those persons who present a tendency to the accumulation of fat. On the contrary, fatty heart is more commonly observed in those who are thin and slight.

The symptoms of fatty degeneration of the heart are Symptoms. extremely indefinite. Very often it is impossible to make the diagnosis with any approach to certainty; in most cases a high degree of probability is all that can be attained. The reason of this unsatisfactory condition of things is that symptoms are often entirely wanting, and when present are those of cardiac weakness, such as are compatible with many and various other causes of the same. The most characteristic features of the malady are the following. The apex beat, normal in position, is feeble, the heart sounds are quite clear and free from all trace of murmur. The pulse is often soft and compressible, and not infrequently slow; it may be not much over 40. There is a general want of vigour, both mentally and physically. The skin is sometimes smooth and glossy. When, with conditions such as these, a patient of middle or advanced age suffers from attacks of syncope or of giddiness, the probability of fatty degeneration being present is considerable. But in many cases the very first indication of the presence of the lesion is the sudden death of the patient, and in such cases death may be due to rupture of the heart itself. Anginal attacks, in which severe pain in the precordial

region, extending down the left arm, is accompanied with terrible anxiety and a dread of impending death, may be due to fatty degeneration of the heart. It is to be particularly noted that it is altogether erroneous to attach importance to the presence of the *arcus senilis* in the diagnosis of this grave form of heart disease. Such a condition of the eye is quite usual in otherwise healthy people.

It is absolutely impossible to say anything definite as to the duration of this malady; but sooner or later well-marked fatty changes in this vital organ lead to death; it may be sudden death, or the fatal event may be brought about through some pulmonary malady, such as pneumonia, which throws on the enfeebled heart a strain which it is unable to endure.

Causation
and Morbid
Anatomy.

There can be no doubt that in many cases the tendency to this disease is hereditary. It is conceivable that the condition may be brought about by a sedentary life and by indulgence in over-eating and drinking, especially the latter. But this is not the usual history of such cases. Many patients have led the most temperate and regular lives under favourable hygienic surroundings, and in them it can only be supposed that hereditary degenerative tendencies, referred to above, are responsible for the morbid change.

In well-marked forms of the malady the change in the muscular substance of the heart is very obvious. The organ is light yellow in colour, greasy to the touch, and extremely soft. The morbid process is most marked in the ventricles, especially the left. The columnæ carneæ are of a mottled yellow colour, to which the term "tabby cat" striation has been applied; the apex of the ventricles, both right and left, is often formed wholly of fat. When the muscular substance is cut it sometimes presents the appearance of wax. Microscopically the changes are found to be those of infiltration and degeneration. Fatty deposits occur between the bundles of muscular fibres, and the contents of the sarcolemma are frequently mere collections of

fat globules, together with the relics of the degenerated fibre. These points are well brought out by treatment of the specimen with osmic acid.

In cases of death from fatty heart the lungs are markedly œdematous, a condition due, doubtless, to the feebleness of the whole circulation which may have existed for some time before the fatal event.

The treatment of fatty degeneration of the heart muscle Treatment. is mainly hygienic, and consists in the avoidance of excitement and of severe exercise, both of which would throw strain upon an already weakened organ. The patient should have explicit directions on these subjects, and should be warned of the danger that besets the giving way to anger, or the indulgence of other passions. Great care should be observed with regard to the regular action of the bowels, straining efforts during defœcation being very injurious. The diet should be wholesome and nutritious, but with a sparing allowance of alcohol. As regards drugs, very little medication is required. Digitalis may sometimes be beneficial when the heart's action is feeble and irregular. Strychnine is a good tonic, so also is quinine. Far more important than the administration of drugs is the scrupulous observance of the rules of life already laid down. Should anginal attacks occur, inhalations of nitrite of amyl may be used, or the nitro-glycerine tabellæ of the B. P. may be administered. In cases in which these attacks frequently recur we have seen fairly good results from the administration of arsenic.

FIBROID DEGENERATION OF THE HEART

As the result of myocarditis, it is not unusual for degenerative changes to ensue in the cardiac muscle characterised by new growth of fibroid tissue, with atrophy and final disappearance of the muscular structure of the organ. To this state of things the term *fibroid degeneration* is applied. It may arise also from atheromatous changes in the coronary arteries leading to imperfection in the blood supply.

It is possible also that similar degenerative changes may arise in the course of syphilis, or in gouty conditions, the morbid process depending, however, in all cases upon disease of the vessels.

Fibroid degeneration may be more or less general, or it may be localised. In the latter case it is possible that aneurysm of the cardiac wall, or rupture of the same, may occur; in the former, the changes are more likely to be in the direction of dilatation of cavities, and the symptoms are then those of failing compensation.

The treatment of the condition differs in no respect from that of fatty degeneration of the heart, but if there is any reason to think that syphilis is a factor in the causation of the symptoms, iodide of potash with a mercurial preparation should be administered. In most cases it is absolutely impossible to definitely diagnose this form of cardiac degeneration.

ACUTE DEGENERATION OF THE HEART MUSCLE

THIS is sometimes a cause of death in maladies accompanied with prolonged and severe elevation of the body temperature, such as enteric fever; or acute degeneration of the cardiac muscular fibre may occur in cases of endo- or pericarditis.

The heart muscle is in all cases pale, soft, and flabby. The change is a general one, though it may be more developed in some localities than in others. Microscopically there is a haziness of outline on the part of the muscular fibres, together with the disappearance of the transverse striation to a greater or less extent, and the development of numerous granules within the sarcolemma. Clinically the presence of this form of degeneration is evidenced by the onset of symptoms of cardiac weakness or failure.

Mild cases of this morbid change are recoverable, and it is very possible that the slow and irregular pulse so often met with after severe attacks of typhoid and other fevers is really due to a cardiac weakness dependent upon slight changes of the nature of those just described.

The treatment of acute degenerative changes in the heart muscle consists in the rigorous observance of prolonged rest in the recumbent position after an attack of those maladies which are prone to be attended with these serious heart changes. In other words, the greatest care should be taken during convalescence from enteric fever or from endo- or pericarditis that due importance is attached to any symptom, however apparently trifling, of cardiac weakness. Any giddiness, slight palpitation, or irregularity on the part of the pulse should at once be regarded as a

danger signal, and be followed by rest in the recumbent position until all risk has passed. This point is not at the present time sufficiently recognised, but its neglect may be followed by very disastrous results.

There can be no objection to the administration of strychnine, or of digitalis or quinine; but in comparison with the importance of rest, that of the administration of drugs is slight, indeed trivial.

ANEURYSM OF THE HEART

ANEURYSM, when affecting the muscular structure of the organ, is a very rare lesion of the heart, and one that it is by no means always easy, and in many cases that it is impossible, to diagnose. The left ventricle appears to be most usually the seat of the affection; the muscular wall of the left ventricle is always degenerate, it may be as the result of atheroma and consequent thrombosis of a branch of the coronary artery, the degeneration being fatty or fibroid. The space about to become aneurysmal yields, and a pouch is formed which may be of small size, or so large as to attain almost the capacity of the heart itself. Its contents are often laminated clot. Such a condition sometimes follows injury to the heart from a wound.

It is scarcely necessary to say that aneurysm of the heart gives rise frequently to highly indefinite symptoms, and very often death from rupture of the aneurysm is the first and last symptom of the disease. On the other hand, in rare cases a marked projection in the region of the heart occurs, which pulsates strongly, whereas at the same time the radial pulse may be quite weak and small from pressure of the aneurysmal sac on the heart itself. Aneurysm of a valve is more often seen; it arises in consequence of inflammation of the valve giving rise to softening of its substance, which yields gradually under the pressure to which the cusps are subjected. The result is the formation of a small, thin-walled pouch, which, in the case of the aortic cusps—far more often affected than are the segments of the mitral valve—projects towards the ventricular cavity. The most usual result is the formation of a perforation of the valve from rupture of the aneurysm. A

variety of murmurs may accompany this morbid condition, but it is impossible to say, in a given case, what murmurs are certainly due to the aneurysm *per se*. When rupture occurs, it is obvious that the signs of incompetence of the affected cusps will at once be apparent.

There is no special treatment for either of these forms of aneurysm affecting the heart, even if the condition is diagnosed, which is seldom the case ; all that can be done is to give as much rest to the heart as is possible by the adoption of those measures which are suitable to cases of valvular disease in general, and especially to those in which compensation has been lost. Perfect rest, both physical and mental, is of the greatest importance.

NEW GROWTHS AFFECTING THE HEART

NEW growths are very seldom met with in the heart, and when they do occur are almost invariably secondary. In this way tubercle may be deposited in the organ, generally as a tuberculosis affecting the pericardium, and clinically recognisable as pericarditis, but also in the form of isolated masses of the size of a pea or bean in the walls of the ventricles. Syphilitic gummata have occasionally been observed in this situation. As regards malignant disease, masses of secondary deposits are sometimes encountered in cases of sarcoma or carcinoma affecting other organs, but as primary lesions are scarcely ever met with. In this connection it is somewhat remarkable that in lympho-sarcoma affecting the anterior or posterior mediastinum and the lung neither the heart nor the pericardium is involved. Hydatid cysts have very rarely been seen post-mortem as affecting the heart.

It is needless to say that symptoms of new growths in the heart substance are generally entirely absent, and, if present, are in no sense characteristic. Unless malignant disease is found elsewhere in the body, it will be impossible to hazard an opinion as to the pathological nature of the heart lesion. When the pericardium is involved the symptoms and physical signs are, of course, those of pericarditis.

RUPTURE OF THE HEART

THIS accident occurs in those cases in which the ventricular walls are already the seat of degeneration, it may be fatty or fibroid, and is sometimes met with as a result of the embolic plugging of a branch of the coronary artery causing acute softening of the muscular area supplied by the vessel. Suppuration of the heart wall and ulcerative endocarditis are also occasional causes of weakness of the muscular wall, which may ultimately end in rupture of the same. As a rule, the left ventricle is the seat of the rent, but it may occur in any of the other cavities. In most cases the blood is rapidly poured through the tear, and fills the pericardial cavity, with consequent pressure on the heart itself; but in other instances the blood escapes but slowly, and its further passage may be arrested by means of a clot which fills the rupture.

It need scarcely be said that in rupture of the heart death generally occurs instantaneously, but this is by no means invariably the case. Instances are on record in which patients have lived for ten or twelve hours after the rupture, and there is good reason to believe that in several cases life has been prolonged for three days. When sudden death does not ensue the symptoms observed are pallor and faintness, attended by a most violent anginal pain in the precordial region. The patient may rally to a certain extent, but as a rule a condition of collapse ensues, and death is not long delayed.

Nothing can be done in the way of treatment except to alleviate the patient's sufferings by the use of morphia hypodermically. Stimulants may also be given.

ANGINA PECTORIS

THIS malady, which is not a substantive disease but a symptom only, may accompany many and various more or less easily recognisable heart lesions ; or, on the other hand, it may be the only symptom for which the patient seeks relief, no morbid condition of the circulatory apparatus being obvious even on the most careful examination. This, of course, arises from the limitation of our powers of observation, for there can be neither doubt nor question that in every case of this formidable malady important structural changes are present. A person, apparently in the best health, may suddenly and without premonitory symptoms be struck down by an attack of this disease, and may die in a few minutes. Far more commonly the attacks occur in those whose heart and vessels are already more or less damaged, and whose health is more or less seriously compromised. The attack is generally induced by some form of severe exertion, or of excitement. Worry and anxiety will also tend to cause an attack in those predisposed. In some cases marked valvular lesions, of which aortic regurgitation is the most frequent, are present, or advanced atheroma of vessels with hypertrophy of the left ventricle may be found. Again, attacks of angina pectoris may occur in those whose cardiac muscle is the seat of fatty or fibroid changes ; and lastly, the symptoms may appear in persons in whom it is impossible to discover any lesion whatever.

The symptoms of the affection consist in the sudden onset of agonising pain in the precordial region, which tends to radiate upwards towards the neck and downwards towards the arm, especially the left, with an indefinable anxiety or terror of approaching death. The suffering of

Symptoms.

the patient is terrible to witness. He becomes ghastly white, and the perspiration may drop off his face through the agony endured. In some cases the pain is most severe in the back. The attack does not last long—a couple of minutes at most, and in many cases does not endure more than a few seconds. Death may ensue in the attack, it may be from syncope. Very often but little change is noticed in the condition of the pulse during the paroxysm. It is not seldom somewhat stronger than usual, but very often it is not materially altered in its character. It may, however, be weak and fluttering. Considerable dyspeptic disturbance may precede or follow an attack of angina pectoris, and in some cases may apparently be the exciting cause of the paroxysm. When no obvious signs of cardiac disease are present, it has been customary to speak of the malady as true angina pectoris, whereas, when the patient is already suffering from aortic or other malady affecting the heart, he is often said to be the victim of anginal attacks. But it is better to employ the term angina pectoris for a certain class of symptoms, however induced and irrespective of the lesion upon which they depend.

Morbid
Anatomy.

From what has already been said on this head, it will be gathered that these lesions are many and various. There can be no doubt, however, that in most cases atheroma of the coronary arteries, or of their branches, is the condition most commonly found post-mortem. It cannot be denied, however, that many cases of undoubted angina pectoris have been recorded in which the coronary vessels were entirely free from disease. It is clear, therefore, that there is no special morbid appearance appertaining to this malady. As regards the condition of the coronary arteries, if the vessels themselves are not atheromatous, it may be that a patch of degeneration is present in the aorta at the orifice of the coronary vessel, which may to a large extent prevent the entrance of blood, and thus interfere with the nutrition of the area supplied by the artery whose orifice

is thus occluded. It must be admitted that disease of the coronary arteries is not infrequently met with post-mortem in cases in which no symptoms resembling those of angina pectoris had been present during life. Clearly, therefore, other factors are at work, depending probably upon affections of the nervous supply of the heart, and of the nature of which we are profoundly ignorant.

Many theories have been brought forward to explain the nature of these attacks. None are of importance, with one exception—that, namely, which attributes the symptoms to weak ventricular contraction struggling with increased peripheral resistance. This is a plausible theory, which is more than can be said for such “explanations” as that angina pectoris is really a neuralgia of the cardiac nerves. Such a theory explains nothing, and is best abandoned. Angina pectoris is a malady the liability to which increases with advancing years. Men are far more liable to the disease than women.

In discussing the treatment of angina pectoris, it is Treatment. necessary to bear in mind the fact that an attack of the malady is nearly always induced by over-exertion or by excitement. It is clear, therefore, that all such efforts must be avoided in those predisposed to attacks of this affection. No hurrying to catch a train must be allowed, and all movements must be quietly performed. As far as possible the patient must avoid worry and anxiety, and should on no account indulge in sexual intercourse, or give way to paroxysms of anger.

In the actual attack the inhalation of nitrite of amyl, contained in a glass receptacle made expressly for this purpose, from a handkerchief will speedily give relief in most cases, ease being obtained when the face begins to flush and the pulse becomes full and bounding. In other cases a few whiffs of chloroform will often at once give relief. In order to avoid attacks, the patient should take three times a day a drop of the one per cent. solution of nitro-glycerine, or the *tabellæ nitro-glycerini* of the

pharmacopœia. The dose can be gradually increased until symptoms occur which show that the limit of toleration has been reached. These symptoms are throbbing of the arteries and flushing of the face. Arsenic is sometimes useful, and also iodide of potash. The latter drug must be administered in full doses and for long periods. When the attacks are rebellious to the usual remedies, hypodermic injection of morphia will at once relieve. In all cases the greatest attention must be given to the state of the digestion, and flatulence and constipation must be diligently guarded against.

Under the most favourable conditions, and when the treatment indicated is fully and conscientiously carried out, the prognosis is most serious, and sudden death in a paroxysm is almost certain to occur sooner or later.

EXOPHTHALMIC GOITRE

THIS singular disease, in which enlargement of the thyroid gland is combined with protrusion of the eyeballs and palpitation of the heart, is most common in women.

Its onset is usually gradual, but it may be sudden. The Symptoms. attention of the patient and her friends may at first be attracted by the increasing prominence of the neck, due to the enlarging thyroid. In other cases palpitation is the first symptom noticed. Again, prominence of the eyeballs may be the very first evidence of the malady. The enlargement of the thyroid is soft, and the right lobe has a slight tendency to become larger than the left; indeed, in some cases the increase in size may be limited to the right lobe. Pulsation in the gland is often observed. Palpitation is frequently a very distressing symptom. The heart beats at the rate of 120, or even more frequently, and the heart sounds are sharp and accentuated, the second sound being particularly loud and ringing. After a time a certain amount of hypertrophy of the left ventricle may ensue. Throbbing of the carotids is often a prominent feature in many cases, and protrusion of the eyeballs tends to become more marked as the malady progresses. This protrusion gives a peculiar aspect to the patient which is at once recognisable. Very often the sclerotic is visible above the upper margin of the cornea, and when the eye looks downwards the movement of the upper lid, which normally follows that of the globe of the eye, may not take place (Graefe's sign). This abnormality is not by any means always present in exophthalmic goitre. Tremor of muscles is occasionally observed in this disease, and should always be looked for. It is to be particularly noted that in many

cases of Graves' disease the three cardinal physical signs and symptoms are not all present. Very frequently one, or even two, of them is absent. Palpitation may be the sole symptom, or this and slight enlargement of the thyroid may be entirely unaccompanied by any prominence of the globe of the eye. Mental changes are a characteristic feature of the disease, and in almost all cases there is some alteration in this respect. Irritability of temper and caprice are of quite usual occurrence, and it is a question if some moral change is not present in every case. A tendency to diarrhoea is another feature of the malady; this may be slight only, and apt to return from time to time. But in some cases it is much more severe, and is rebellious to treatment and exhausting. Indeed, we have seen a case in which death ensued as the result of most severe diarrhoea which was not amenable to any form of treatment, and for which no cause could be assigned further than that the case was one of Graves' disease. There can be no doubt that this malady generally gets well of itself, but it may be years before this desirable end is attained. It is particularly liable to periods of amendment, followed by relapses.

Causation
and Morbid
Anatomy.

Of the causation of exophthalmic goitre nothing definite is known. The symptoms have sometimes followed, quite suddenly, shock, great anxiety, or other nervous influence; but in most cases nothing of the kind has occurred, and the disease is met with in those most favourably placed, both financially and otherwise. It must be admitted that we are quite ignorant of the cause of this disease. The malady has been supposed to depend upon a morbid condition of the cervical sympathetic, or again upon lesion of the medulla or cervical cord. Some have thought that the symptoms are due to the excited action of the heart. All of these are pure hypotheses, and none satisfactorily explain the observed phenomena. A more probable view is that which attributes the malady to increased functional activity of the thyroid gland.

All kinds of changes have been described as affecting the

histological structure of the sympathetic and spinal nervous system, but none of these changes are definite and consistent. In fatal cases the post-mortem appearances are those of the complications which cause death.

Considering our ignorance of the real nature of this disease, it is not surprising to learn that its treatment is most unsatisfactory. Further, when benefit appears to follow any special line of treatment let it be remembered, as a chastening influence, that this malady shows a marked tendency to amend of itself, even if the improvement is only temporary. It is important to keep the patient among healthy and cheerful, but not exciting, surroundings. Sometimes travel abroad benefits these patients. As a rule, they do not bear high altitudes well. The food should be nutritious and abundant, but stimulants are best avoided. Treatment.

There is little to be said as regards drugs; we have never seen benefit accrue from their administration. Neither iron, nor iodine, nor arsenic, and still less the administration of tabloids of thyroid gland or of supra-renal extract, have been in our experience of avail; indeed, the two latter may be positively injurious in their effect. Nothing is to be hoped from the employment of electricity, though such treatment is often recommended. It is a *placebo* and nothing more.

PALPITATION

PALPITATION, or undue rapidity and force of the heart's action, is a malady not seldom encountered. It is usually of functional origin, but may occur in cases in which organic disease of the valves or muscular structure of the heart is present.

Symptoms.

The symptoms of palpitation are a sense of beating and fluttering in the cardiac region, with frequently an occasional throb in the same locality, and a general sense of discomfort and anxiety. In some cases a feeling of giddiness or of actual faintness is complained of. The pulse may be found beating at the rate of 120, 130, or even more rapidly than this, and intermissions may also be present. The attacks are apt to be induced by excitement, overwork, or anxiety, and may also supervene when the patient is confined to a close, stuffy room. On auscultation the sounds of the heart are often noticed to be loud and metallic in quality, and the resemblance of the first to the second sound may also be very close. In some cases systolic murmurs are developed, which are usually loudest at the base. The impulse of the heart will often be found to be unduly extended, and the apex beat is much more forcible than is the case in health. As a rule, the attack soon passes off, but is apt to be renewed on a recurrence of the exciting cause. The tendency to palpitation will persist just so long as the latter continues.

Causation.

We here speak only of the causation of functional palpitation, excluding all those cases in which the symptom is due to organic disease of the heart. It may be said, speaking generally, that when a patient complains of

attacks of palpitation the chances are his heart is free from disease. In organic affections of the heart complaint of this kind is seldom made, at all events so long as the compensation remains good. Palpitation is frequently due to anæmia, and in girls suffering from this common disease it is often one of the most usual symptoms. Dyspepsia is a most fertile cause of the malady; all kinds of indigestion may be accompanied with palpitation, but the flatulent form of the affection is especially prone to be united with this symptom. In such cases much relief is often obtained by free eructation, which shows conclusively the dependence of the heart symptoms on the flatulent distension of the stomach. The abuse of tobacco, especially common in young men, but by no means confined to them, is a most potent cause of palpitation. So also is venereal excess or the indulgence in bad habits. The affection is also very frequently met with in cases of exophthalmic goitre. In this malady it may be the most prominent, indeed the only, symptom.

Anxiety, worry, and nervousness of all kinds may lead to troublesome palpitation, and in cases in which the cause is not obvious, it is necessary to bear this fact in mind.

The treatment of palpitation cannot, of course, be efficiently carried out until the cause of the malady is ascertained, for it consists essentially in the removal of the condition upon the presence of which the symptom depends. But immediate treatment is often required, and this consists in the patient remaining perfectly quiet in the recumbent position; in most cases the administration of aromatic spirit of ammonia or some other stimulant gives relief. In some cases a dose of bromide of potassium may be useful. The application of an ice-bag to the precordial region is sometimes recommended. Attention should always be devoted to the condition of the stomach, as some form of dyspepsia is constantly present. We have occasionally found intractable forms of palpitation, in which

Treatment.

derangement of the stomach was very marked, to be amenable to large doses of bicarbonate of soda taken in effervescence with citric acid immediately after a meal; and brisk exercise on horseback, when combined with this treatment, seemed to have a still more satisfactory influence, for the malady soon amended. It is scarcely necessary to say that, before recommending such measures, every care must be taken to exclude the presence of organic disease of the heart. In all cases of palpitation the use of tobacco should be absolutely prohibited. Especially is it necessary to protest against the evil habit of cigarette smoking in this connection; it is a most fertile cause of palpitation. Digitalis, belladonna, and strychnine may all be useful auxiliaries in the treatment of the malady; and when anæmia is present, the administration of iron may lead to a cure of the palpitation.

CONGENITAL HEART DISEASE

THE most usual lesions found in congenital disease of the heart are persistence of the foramen ovale, or aperture of communication between the auricles; an opening in the ventricular septum, persistent ductus arteriosus, and narrowing of the pulmonary orifice. These abnormalities depend largely upon defects of development and the persistence of embryonic stages. In some cases, less frequently observed, the aortic orifice is found to be stenosed. Not seldom the valves are the seat of various abnormalities, their ordinary number being exceeded or fallen short of; again, the several cusps may be more or less united, or even completely fused one with the other. It has been thought by some that valve defects of congenital origin are really due to intra-uterine endocarditis; it is more likely, however, that this is not the case, the defective development of a valve having been mistaken for the result of inflammation.

The symptoms of congenital heart disease and the physical signs of the same are shortness of breath, drowsiness and lethargy, clubbing of the terminal phalanges of the fingers and cyanosis, together with alteration in the size of the cardiac dulness and the position of the apex beat, combined with the presence of murmurs, often loud and harsh, on auscultation. As a rule, cyanosis appears soon after birth, and is often very intense, being greatly increased by any excitement or over-exertion. As the child grows older the same signs and symptoms persist, and in addition it is liable, on very slight provocation, to violent outbursts of temper, which are followed by much prostration. These children do not generally live to attain the age of puberty, and still less

that of adult life. They are very susceptible to cold, and not seldom they die from bronchitis or pneumonia, the result of exposure. Attacks of palpitation are often complained of, and the exaggerated action of the heart may be obvious both to sight and touch. The combination of narrowing of the pulmonary artery with persistent opening between the ventricles, and occasionally also with patent foramen ovale, is that most usually present. On auscultation loud, harsh murmurs are often audible over the pre-cordial region, and a loud systolic murmur over the pulmonary orifice is certainly the abnormal sound most frequently heard. Pulmonary stenosis being by far the most usual lesion, the frequency with which the murmur just referred to is audible is easily explained.

Much more rarely pulmonary regurgitation is met with ; in this case a diastolic murmur is heard over the pulmonary area, and is conducted down the sternum over the right ventricle. This condition is obviously difficult to differentiate from aortic reflux, but the age of the patient, the presence of marked cyanosis, the absence of any history of acute rheumatism, and especially the great enlargement of the right ventricle, will aid in forming a correct diagnosis.

It must be added that it is often quite impossible to determine with accuracy the particular variety of abnormality or abnormalities affecting the heart in congenital disease, for neither the physical signs nor the history of the case supply the data which are necessary to arrive at a sound conclusion as to the nature of the defects which are present.

The child should be most carefully guarded against chills, as an attack of bronchitis in this malady is often fatal. Nourishing food should be ordered, and every effort made to guard against excitement and fits of passion, both of which are highly injurious. If dilatation ensue, rest and digitalis may be useful ; in fact, the treatment varies in no respect from that already discussed under dilatation of the heart.

TRANSPOSITION OF THE HEART

IT is sometimes accidentally discovered that the heart is transposed to the right side. This may or may not be accompanied with transposition of the liver, etc., but usually the heart is only one of the organs of which the position is altered, cases in which the transposition is limited to the heart being but rarely observed. We have, however, met with a case in which the heart alone was transposed in a boy of eighteen, who came for advice concerning some malady unconnected with the circulatory system, and who was quite unaware of the abnormal position of his heart.

ANEURYSM OF THE AORTA

ANEURYSM of the aorta may be so obvious that it can be diagnosed by a tyro ; or again, it may be so latent that its discovery will tax the resources of the most accomplished investigator. There are cases where nothing more than a suspicion of its presence can be held, it being absolutely impossible to be certain that aneurysm is present.

Symptoms.

Amongst the most important symptoms of the disease is pain. This may be very slight, or so severe as to amount to agony. The pain is usually localised and persistent. It is needless to say that this symptom is much more valuable in males than in females, and it may be laid down as a general rule that fixed and persistent pain in a male should never be treated lightly from the point of view of the possibility of aneurysm. Shortness of breath, especially on exertion, may be a prominent symptom.

Symptoms due to pressure on various organs within the thorax are of great importance. Difficulty in swallowing may be due to pressure on the œsophagus ; difficulty in breathing to pressure on the trachea or bronchi ; swelling of the neck or of an upper limb may be caused by pressure on veins. In some cases enlargement of the veins of the front of the thorax may be due to pressure upon the cavæ. Pressure on nerves may cause severe pain.

The physical signs of aneurysm are those due to the presence of a tumour which pulsates, and those due to pressure of the same on surrounding organs. When the aneurysm comes forward and points under the ribs a pulsating tumour is observed. This tumour expands laterally with each ventricular contraction ; it is dull on

percussion, and tends to increase in size. On auscultation it is usual to hear a murmur, which is generally systolic, may be diastolic, and is often double. The effects of the pressure on neighbouring organs are very various. The root of the lung may be compressed, with consecutive weakening of breath sounds over that side of the chest. The pulse on the affected side may be smaller than the healthy pulse, owing to pressure on the sub-clavian, and it may also be somewhat delayed. Great œdema of the side of the neck and face, or of the upper extremity, may be the result of pressure on veins.

A very common occurrence is for the left recurrent laryngeal nerve to be compressed as it winds round the arch of the aorta. The left vocal cord is then paralysed, and lies midway between full opening and closing of the glottis. It is in the so-called "cadaveric position." The result is hoarseness of voice, which is a very important symptom. If the lung is compressed, pneumonia or gangrene may be induced, and the pressure may give rise to oozing of blood, possibly manifesting itself by slight hæmoptysis. Should the sympathetic be pressed upon, affections of the pupil may be the result. Not infrequently the pupil on the affected side is diminished in size from paralysis of the sympathetic; on the other hand, should irritation of the fibres of the sympathetic be present, the pupil may be widely dilated. Vaso-motor changes, pallor, or hyperæmia, affecting the same side of the face, may also be occasionally observed. Pains in nerves of the upper extremities may be induced by pressure on the brachial plexus, and even wasting of muscles may ensue from the same cause. Death may follow from the results of pressure, or the aneurysm may rupture. This may occur externally or internally; in either case sudden death ensues. In certain cases, chiefly those of some duration, the terminal phalanges of the fingers on the affected side may be markedly clubbed. A physical sign to which much weight has been assigned is the so-called "tracheal

tugging." This inelegant term is applied to the drawing down of the trachea which ensues at each systole when the cricoid cartilage, held between the finger and thumb by the observer, is pushed gently upwards, the patient at the same time holding his breath. This phenomenon may be observed occasionally in perfectly healthy people.

Aneurysms of the arch of the aorta may occur in the ascending arch, the transverse arch, or the descending arch. Those in the ascending arch are situated either within the pericardium, in which case they are quite latent, and death from rupture into the pericardial sac may be the first and only symptom; or they occur in the arch after its exit from the pericardium. In the latter case the physical signs are usually clear and distinct. The aneurysm tends to present forwards, and forms a pulsating tumour which is observed in the second and third right intercostal spaces. Aneurysms of the transverse arch are often quite latent as regards an obvious pulsating tumour. From their situation they tend to cause early and serious pressure on important and, indeed, vital, organs, and they do not, as a rule, for this reason run a prolonged course. Aneurysms of the descending arch generally occur at the junction of the transverse and descending aorta. They may present on the left side of the sternum, or, going backwards, may compress the left lung and other organs. Both in this situation and in the transverse arch aneurysms are particularly liable to cause paralysis of the left vocal cord in the manner described above.

Aneurysms are liable to be mistaken for malignant growths in the chest, or *vice versa*. Sometimes it is far from easy to distinguish between them, and if the growth pulsates from transmitted aortic pulsation, then the diagnosis becomes still more difficult. It is usually laid down that unless the pulsation of a tumour is expansile, *i.e.*, unless all the diameters of the mass increase at each beat, then the tumour is not an aneurysm. This is all very well in theory, but in practice the matter is quite different,

and in some cases it is really impossible to say whether the expansion occurs in the way indicated above or not. As a very general rule, it may be said that the tendency of aneurysm is to obstruct the arterial, whilst growths tend rather to hinder the venous circulation. Certain it is that very often dilated veins are a conspicuous feature in the neighbourhood of malignant growths in the chest.

Abdominal aneurysms are even more difficult to diagnose than are those of the chest. Nothing is more common than to meet with excessive aortic pulsation in the abdomen, especially in women, nervous young men, and in cases of gastric affections and anæmia. It may be very difficult to differentiate between such pulsation and that due to aneurysm. The question of lateral expansion here is much more easily settled than in the chest; when present it undoubtedly points to the diagnosis of aneurysm. Masses of cancer or of other growths situated over the aorta are very apt to be mistaken for aneurysmal tumours.

Pain in the back is a very important symptom of abdominal aneurysm, especially in men. It should never be forgotten that such pain may be the only evidence of the presence of the disease. We recall a case of this kind, in which a middle-aged man had for several years complained of pain in a fixed spot in the lower dorsal region. He had been examined repeatedly by many doctors, but no cause for the pain could ever be made out. All physical signs of aneurysm were entirely absent, and the patient was thought to be a hypochondriac. He died suddenly. At the post-mortem examination the abdominal cavity and retro-peritoneal tissue were full of blood clot. A large aneurysm of the abdominal aorta existed which had pressed on the lower dorsal and upper lumbar vertebræ so as to cause complete excavation of their bodies, and corresponding implication of nerves. Such a case is of the utmost importance, and proves that it is never safe (at least in the male) to treat fixed pain lightly.

It need scarcely be said that the prognosis of aneurysm of the aorta, whether thoracic or abdominal, is extremely unfavourable. Not seldom death occurs suddenly from rupture of the sac, either externally or internally. In other cases life may be prolonged for a considerable period, and the patient may die worn out with the pain, or from pressure upon the œsophagus, leading to the impossibility of sufficient nourishment being taken. In such cases death is due to asthenia. Again, pressure on the lung may cause pneumonia or gangrene of the organ; further, paralysis of the crico-arytenoideus-posticus muscles may lead to death from asphyxia.

Morbid
Anatomy.

The seat of the degenerative process in atheroma of the aorta is the deeper layer of the inner coat of the vessel. This locality becomes the site of an infiltration of indifferent cells which by their accumulation tend to raise up the inner wall of the vessel in the form of a small hemispherical prominence. The natural structure of the wall of the aorta, owing to the cellular infiltration and subsequent degeneration, undergoes important changes whereby fatty alterations are initiated, and the normal elasticity of the vessel becomes greatly prejudiced through decay of the yellow tissue which forms so prominent a feature in its composition. Softening may proceed to a marked extent, and a so-called "atheromatous abscess" may result, its contents being composed of the degenerated cellular infiltration and remains of the components of the arterial wall. In such cases the inner lining of the vessel over the diseased spot remains intact, but frequently this too gives way, and then the atheromatous detritus is exposed, and may even be washed into the blood stream. Serious consequences may ensue from this accident, as the onward progress of the atheromatous material may be arrested by its impaction in a smaller vessel, with resulting embolism. When, by the destruction of the lining membrane of the internal coat, the contents of the atheromatous abscess are thus exposed, an "atheromatous ulcer" is said to be present. In the caseous

débris left by the degeneration of the internal coat of the aorta calcareous deposit sooner or later occurs, and it is quite usual to find, post-mortem, portions of the vessel which have become perfectly rigid, the calcified localities being curved in conformity with the shape of the aorta.

Another change which ensues is the fibroid, in which the elasticity of the vessel entirely disappears, being replaced by a dense firmness ; this change is due to the fibrillation and fibroid transformation of the abundant cellular infiltration of the inner and middle coat of the vessel.

The result of these alterations is that the elasticity of the aorta is no longer present, and, owing to the weakening of its walls, it yields under the pressure of the blood. The site and extent of the yielding depend, of course, upon the location and extent of the atheromatous process, being more marked in one place than in another. But a cursory inspection of the vessel, with its atheromatous elevations and ulcers, its calcareous plates and thinned-out fibrous wall, will convince anyone that, even in those portions of the aorta which are not aneurysmal, all the factors are present for the production of an aneurysm, and that such a morbid condition, although not actual, is potential in the whole course of the aortic arch. This is an important point in prognosis and treatment, and will be again alluded to.

The degenerative changes which affect the arteries are very similar to those which are found in the aorta, but the process in them is less acute, partaking more of the character of calcareous and fibroid degeneration, by which the elasticity of the vessel is impaired, its thickness increased at the expense of the lumen, and its inner surface roughened. These changes lead to the well-known results of arterial degeneration, viz., the defective nutrition of the brain and other organs from inadequate supply of blood, and the marked tendency to thrombosis, which is such a striking feature of this degeneration when affecting the smaller vessels. It must be borne in mind that very marked

disease both of the aorta and of the vessels generally may be induced by syphilis ; indeed, one of the great dangers of this malady is the tendency, in its later stages, which it often manifests to cause special vascular degeneration.

Aneurysm is due directly to disease of the wall of the vessel. The changes in the inner and middle coats comprised under the head of atheroma are present, and the pressure of the blood within the vessel leads to yielding of the arterial wall. It should never be forgotten, in considering the question of the treatment of aneurysm, that what we see is only one portion of the affected aorta. In all cases of aneurysm coming under the cognizance of the physician, the disease is not confined to the portion of aorta under observation. There are certain to be other diseased spots in the vessel, some of which have already yielded, and others which are in direct progress to the same result. This being the case, it stands to reason that, even if the lesion presenting itself to observation were cured, the cure would be but partial, for it is impossible to suppose that the rest of the mischief can be successfully treated. To do this would be equivalent to giving the patient a new aorta. This point is too frequently lost sight of in discussing the treatment of this disease. There can be no doubt that syphilis, alcoholic excess, and strain, especially sudden strain, are most potent causes of aneurysm. The two former act by inducing disease of the aortic wall, and the latter by imposing on it a requirement which in its diseased condition it is unable to furnish. Some cases, too, would lead us to infer that aneurysm of the aorta may be occasionally caused by violence, a blow on the chest, for example. But in such instances there is every reason to believe that the vessel was already diseased.

Aneurysm may be *true* or *false*. In the former the coats of the vessel have not given way, whereas in the latter rupture of the aneurysmal sac has occurred, the blood being contained in the surrounding tissues. When the inner coat has ruptured, but the outer remained intact, so that the

blood is extravasated, as it were, into the thickness of the arterial wall, a *dissecting* aneurysm arises. When the aorta is more or less uniformly dilated a *fusiform* aneurysm results; when a portion of the circumference of the vessel yields, then a *sacculated* aneurysm is said to be present.

As aneurysm is dependent upon disease of the arterial wall, and as such disease is seldom observed in young people, it is obvious that the malady will be chiefly met with in those of advancing years. Thus the disease is one especially of middle life, during the period of mental and bodily activity; perhaps from thirty-five to fifty-five is the age at which the affection is most frequently met with. Yet from time to time cases are encountered in which aneurysm of the thoracic or abdominal aorta is present at an age generally considered to be exempt from its incidence. For instance, we have seen an abdominal aneurysm in a man of twenty-four, depending upon localised atheroma of the vessel, for the occurrence of which no adequate explanation was forthcoming.

Aneurysms are far more often met with in males than in females, and when they do occur in the latter it is very frequently indeed in connection with syphilis and with habits of intemperance. Thus they are occasionally seen in prostitutes, a class especially exposed to both the agencies just referred to.

It must be admitted that the treatment of thoracic and Treatment.
abdominal aneurysm is extremely unsatisfactory. A cure of the disease has been attempted by the adoption of measures which cause coagulation in the aneurysmal sac. These measures may be surgical or medical. The surgical procedures include the passage of large quantities of fine wire into the cavity of the aneurysm, with or without subsequent electrolysis. Electrolysis alone has also been employed. None of these measures give satisfactory results, and their employment is not unattended by grave risk.

The medical treatment of the disease consists essentially in the endeavour to promote consolidation in the sac by complete rest, both mental and bodily, and by the adoption of a most restricted diet, solid and fluid, in the hope that a coaguable condition of the blood may be thereby induced. This method, when carried out in its full rigour, can hardly ever be tolerated by the patient, and in nearly every case can be borne in a modified form only. It is known as Tufnell's treatment. As has been already pointed out under the head of the morbid anatomy of aneurysm, if it were possible to cause filling-up of the sac which is patent to observation, yet no permanent advantage would be gained, for in all cases other portions of the aorta are diseased, and in an incipient stage of aneurysmal dilatation. And the truth of the assertion is well shown in the history of a few cases in which, by electrolysis, or otherwise, an aneurysmal sac of the aorta has been consolidated. It will be found that in such so-called "cures" the patient has frequently succumbed to the ravages of a new and hitherto undiagnosed aneurysm affecting another portion of the aortic arch.

We are persuaded that the rational treatment of thoracic and abdominal aneurysm is not surgical, but consists in the adoption of those measures which will give the patient a tranquil life, free from worry and anxiety, the diet being carefully regulated in the sense of giving the circulation as much repose as possible. Particular symptoms will, of course, require treatment. Of these, *pain* is often one of the most pressing. Iodide of potash will in rare cases prove of value in relieving pain, and may be given independently of this symptom, as it appears in some cases, probably syphilitic, to have a favourable influence apart from its pain-soothing properties. When pain is severe, morphia may be employed either by the mouth or hypodermically. Should much pain be experienced in the aneurysmal sac, the application of an ice-bag or of a bandage may give relief in some cases. When, through pressure on the

œsophagus, swallowing is difficult or impossible, resort must be had to rectal feeding. In those cases in which the crico-arytenoidei postici muscles are paralysed the operation of tracheotomy must not be delayed, for at any time an attack of suffocation may supervene which may be rapidly fatal. In all cases the use of stimulants and of tobacco should either be entirely forbidden or at all events greatly restricted, on account of their influence on the circulation. The quantity of fluids taken should be restricted as far as possible.

In the treatment of abdominal aneurysm situated low down in the course of the vessel, pressure applied continuously for many hours has been tried. The pressure is, of course, applied on the proximal side of the diseased portion of the vessel over the presumably healthy aorta, and must be kept up under anæsthesia. This method of treatment has not given satisfactory results, and there is also considerable risk of injury being done to important structures in the vicinity of the aorta.

VASCULAR DEGENERATION—ATHEROMA

ALLUSION has already been made in the article on aneurysm to the subject comprised under the above heading, but it is necessary to consider the nature and association of arterial disease somewhat more in detail in this place. As years advance there is always a tendency for the arteries to lose their elasticity, to become more rigid, and in advanced life such changes are so much the rule that they can scarcely be regarded as evidence of the existence of disease. But similar and more marked changes may be due to a morbid process, and then may occur in much younger people, even in those between twenty and thirty. It has been mentioned, in speaking of aneurysm of the aorta, that the chief causes of arterial degeneration are syphilis, alcoholic excess, and over-exertion. But it must be added that a tendency to a similar morbid change may be the result of an inherited taint. It is certain that this is the case, and in not a few instances such hereditary tendency is associated with the insidious onset of granular disease of the kidneys; indeed, vascular degeneration and chronic renal disease are so closely connected that they may almost be regarded as more or less combined in every case.

It is important to remember that atheromatous changes in the arteries are not by any means liable to attack the whole arterial system at the same time. A very curious selective power seems to be at work as regards the distribution of the morbid process. Thus it may be that the arteries composing the circle of Willis are extremely degenerate, while the arch of the aorta is sound, or at most, the seat of a few specks of atheroma just above the aorta cusps; or the cerebral

vessels may be healthy while the aorta is extremely diseased, or even the seat of aneurysm. It must be within the experience of all that atheroma may affect the arch of the aorta to an extreme degree, while the abdominal portion of the same vessel is free from evidence of any degenerative change. And hence it must not be forgotten that the radial artery may show no evidence of atheromatous changes, which are nevertheless extremely developed in the cerebral vessels. More suggestive as indicating the condition of these vessels is the state of the temporal artery. This, as is well known, is often easily seen, and may in some cases be very prominent to the eye and hard to the touch through atheromatous degeneration.

The symptoms of vascular degeneration are often slight and inconclusive, being more or less united with and overshadowed by those of the co-existing disease, especially of chronic renal disease, with which atheroma is so often combined. When the cerebral vessels are the seat of the morbid change, complaints are sometimes made of headache, giddiness, or of noises in the ears. Whether such noises are really due to the friction of the blood against the roughened walls of the vessels is by no means clear, though it does not seem impossible that such may be their mode of origin. Loss of memory and even marked mental changes leading to dementia may also in some cases be due to atheroma of the cerebral vessels, which causes minute foci of thrombosis and consequent softening. The bearing of this degenerative change in the cerebral vessels upon the production of hemiplegia will be fully discussed in the article on cerebral embolism and thrombosis. Symptoms.

When atheroma affects the aorta and peripheral arterial system, the symptoms are so intimately connected with those of aortic and heart disease that it is almost impossible to say how many and which of them are due to the involvement of the vascular system alone.

The treatment of vascular degeneration is obviously prophylactic, and consists in the adoption of such measures as Treatment.

may prevent or delay the onset of the disease in those pre-disposed ; or, should the malady already exist, its further development. Moderation in eating, in drinking, and in physical exertion, attention to the hygiene of the skin, and the avoidance of worry and anxiety, these are the means which must be made use of in dealing with cases, actual or potential, of the malady.

When the morbid change is actually present, there is some reason to think that iodide of potash or of soda may be of value ; but at the best, palliation is all that can be attained, and sooner or later the victim of arterial degeneration, even if he escape the risk of aneurysm or of cerebral hæmorrhage, will die from the results of chronic renal disease, from senile gangrene, or from some malady directly due to the disease of his arterial walls.

RAYNAUD'S DISEASE

THIS malady, first described by Raynaud, shows itself by a condition of more or less symmetrical circulatory disturbance, affecting chiefly the fingers and toes, but not confined to these parts, as it may be seen in the ears and nose, and in the skin generally.

In the mildest form of the malady, that generally seen, Symptoms. the affected parts are cold, livid, and may feel to the patient more or less numb. When the condition is present in a more severe form, all these signs are accentuated; and in addition, there is complaint of considerable pain in the affected areas. Cutaneous sensibility is often greatly dulled, and much swelling of the hands and feet may occur. In its most pronounced form the disease leads to actual death of the affected parts; gangrene occurs, the tissues of the affected fingers necrose, blebs and bullæ form, sensation is totally abolished, and the phalanges may fall off. This most severe stage of the malady is very seldom met with, but undoubtedly the mildest type of Raynaud's disease is of by no means uncommon occurrence.

We have recently seen a boy of fourteen in whom the capillary circulation, not merely in the fingers and toes, but of the whole skin, was sluggish and weak. The extremities manifested the cold feel and blue appearance peculiar to the milder form of Raynaud's disease, but the skin of the trunk, arms, and legs had also a similar aspect, the areas of weak circulation being arranged in more or less large and symmetrical patches. With this debility of the capillary circulation there was combined considerable weakness of the walls of the superficial veins, naturally most marked in the lower extremities, where, indeed, a certain amount of

œdema was present, for which advice was sought. This boy had no heart disease; he suffered in winter greatly from chilblains, but was otherwise healthy. It is obvious that, being due to capillary weakness, the effects of this condition will be most marked in those parts where the circulation is naturally feeblest. Hence it arises that the chief seat of the disturbance is in the extremities, and those localities furthest removed from the heart. We are greatly inclined to think that if the whole cutaneous surface were examined, the condition of skin described above in the boy of fourteen would be found to be present in most cases of Raynaud's disease.

In some patients suffering from this malady, a tendency to attacks of hæmoglobinuria has been noticed; this is an important association, and one having an obvious bearing on the pathology of the malady.

The duration of Raynaud's disease is prolonged, and it shows stages of varying degrees of activity. The prognosis is good; the milder cases, those most usually observed, may last for years, and in some cases recovery may then ensue. Even in the severe form there is a prospect of much improvement, and gangrene, should it occur, is often in small patches only.

Causation
and Morbid
Anatomy.

Numbers of causes have been assigned as efficient in this malady. It is very doubtful if the majority of them have much influence in the production of the symptoms of Raynaud's disease. The most usual and efficient provocative of the phenomena of the disease is exposure to cold. There is a certain amount of evidence which tends to show that the malady affects specially those whose family history reveals a neurotic tendency.

The morbid anatomy of Raynaud's disease shows changes that are neither constant nor definite, and in many cases no abnormality whatever is discoverable.

It may be said, in general terms, that the symptoms are probably the result of local vasomotor changes leading to spasm of the vessels supplying certain areas, especially

those of the terminal phalanges both of the fingers and toes, and of the nose and ears. There can be little doubt that the pathology of Raynaud's disease is closely related to that of paroxysmal hæmoglobinuria, and, as already mentioned, the two maladies are occasionally present in the same subject. It is extremely likely that many cases are classified as belonging to this affection which are in reality examples of totally different maladies, *e.g.*, peripheral neuritis.

This consists in maintaining the warmth of the affected parts by appropriate coverings, and in keeping the general health in the best possible condition. Gentle friction of the diseased areas may be of use. Should gangrene occur, it must be treated according to the principles suitable to that condition. Pain may require special attention; it may sometimes be relieved by warm water bathing, and by the application of belladonna or other soothing ointments. When not amenable to other means, pain must be assuaged by the use of opium given by the mouth, or hypodermic injections of morphia must be employed.

Treatment.

DIVISION III

DISEASES OF THE RESPIRATORY ORGANS

DISEASES OF THE LARYNX

FACILITY in the use of the laryngoscope can only be acquired by practice. It is superfluous to enter into a description either of the instrument or of the *modus operandi*, as a knowledge of both can be efficiently acquired only by actual experience. Care should be taken not to touch the fauces or soft palate with the hand mirror, or retching will be excited. The tongue must be gently handled, and great care must be taken that the hand mirror be not too hot. It is of much importance that the student accustom himself from the outset to the use of the mirror held in the left hand equally as in the right. In operative interference in right-handed people the right hand must be free; in fact, the successful laryngoscopist must be ambidextrous. In some cases the vowel *e*, in others *ah*, is the most useful for obtaining a complete view of the larynx.

Examination must be short; it is useless to continue when once the patient has retched. In cases in which it is impossible to obtain a view of the interior of the larynx, owing to the excessive irritability of the fauces leading to retching, the use of a cocaine spray (5 per cent.) a few minutes before the examination is made will usually render the latter easy of performance.

ACUTE LARYNGITIS

LARYNGITIS, or inflammation of the lining membrane of the larynx, may be acute or chronic.

The symptoms of acute laryngitis are in some of its forms extremely urgent; dyspnoea, with stridulous croupy respiration, recession of chest walls, and huskiness of voice are the chief symptoms of that form of the malady in which the inflammation is very intense. In such cases evidences of œdema of the larynx may soon be apparent, and may place the patient's life in grave peril. In less severe forms of the affection, those most commonly met with, there may be no more than uneasiness and dryness in the region of the larynx, together with slight cough, huskiness, and difficulty in speaking. These are all the symptoms usually met with in ordinary laryngeal catarrh, whether associated or not with catarrh of the bronchi.

The laryngoscopic appearances of acute laryngitis consist in redness and swelling of the mucous membrane. The strikingly white appearance of the vocal cords is replaced by a reddish hue, and the aryteno-epiglottidean folds are also reddened and swollen. When secretion has taken place, patches of mucus are often observed adhering to the inflamed membrane. The epiglottis often shows similar changes.

Much the same symptoms as those which characterise acute laryngitis are met with in the chronic form of the malady when consecutive to acute catarrh of the larynx; but they are less severe, consisting chiefly in a troublesome, irritating cough, and in a sensation of tickling in the larynx. Pain is seldom complained of, but huskiness of voice is invariably present, this and all other symptoms

being much aggravated when use is made of the vocal apparatus. When examined with the laryngoscope, nothing more is seen than slight redness and swelling of the mucous membrane, and in severe cases some slight superficial erosion of the same.

Acute laryngitis is often caused by exposure to vicissitudes of temperature, especially to draughts, when the body is over-heated. It may occur alone, or in combination with acute bronchitis. Acute laryngitis in hospital practice is not infrequently seen in young children as the result of attempting to drink out of a kettle in which water is boiling ; it occurs also in some of the infectious fevers, such as measles.

In simple acute laryngitis very little treatment is usually required ; the patient may be confined to the room in order to avoid exposure ; speaking must be prohibited, and inhalations of steam may be employed. If desired, the latter may be medicated in various ways ; perhaps a drachm of compound tincture of benzoin in a pint of boiling water is as effective as any other inhalation. To allay the cough, small doses of opium may be necessary. In those severe cases to which allusion has already been made, the treatment is that appropriate to œdema of the larynx.

CHRONIC LARYNGITIS

THE symptoms of this complaint are much the same as those of acute catarrh, only milder. Tickling and irritation in the throat and larynx may be complained of, and troublesome slight cough may also be present; but as a rule the chief symptom concerns the condition of the voice. This is somewhat husky, thick, and uncertain, the trouble being nearly always worse in the morning and after prolonged use, as in singing or speaking efforts. Attempts to clear the throat are frequent, and may be attended by a very slight removal of mucus. The condition gives rise, in many cases, to so little trouble that advice is not sought; but in those in whom the integrity of the voice is of the first importance, as singers and public speakers, the trouble is serious and distressing.

Very often an acute laryngeal catarrh may, as already mentioned, pass into a chronic condition; but chronic laryngitis may also arise from over-exertion of the voice or from the inhalation of irritating particles. It is a very frequent occurrence in connection with nasal disease, any impediment to the free passage of air through the nose being liable to complication with this complaint. Excess in the use of tobacco, and, still more, over-indulgence in alcohol, are often attended by chronic laryngitis. Pathologically, the disease is due to chronic hyperæmia of the mucous membrane lining the larynx; this membrane is reddened, the vessels are dilated, and there is thickening of the whole mucous surface. Erosions of this surface are but rarely observed. The thickening is most marked over the aryteno-epiglottidean folds and arytenoids.

Treatment will consist in ascertaining to what cause the

chronic inflammation is due ; in a large number of cases it will be found that the nasal air-passages are at fault, either through overgrowth of the turbinate bones or to deflection of the septum. This must be remedied, and when the cause is removed it is probable that the laryngeal catarrh will soon disappear. In cases in which the malady is due to over-exertion of the voice, complete rest of the same must be strictly enjoined. Subsidiary treatment consists in the employment of sprays, such as nitrate of silver (5 grs. to the oz.), or chloride of zinc (2 to 6 grs. to the oz.). Weaker applications more frequently used are of greater value than those which are stronger, but less frequently applied.

ŒDEMA OF THE LARYNX

ŒDEMA of the larynx may, as already remarked, supervene in the course of ordinary acute laryngitis. It is of somewhat common occurrence in the case of children who have put their mouths to the spout of a kettle when boiling on the fire; such cases are usually seen in hospital practice only. It occurs also in the course of scarlet fever, in erysipelas affecting the fauces, or in cellulitis of the neck. It may be met with in renal affections, and may arise in cases in which aneurysmal pressure occurs on the efferent veins of the larynx. Œdema also occurs as a complication of tumour, of cancer, syphilis, or of tuberculosis, when affecting the larynx. In all these cases the œdema is, of course, secondary to the fundamental disease. Pathologically, the malady is due to sudden pouring out of blood serum; the lesion is not inflammatory. The exudation is naturally most abundant where the tissues are most lax; as a rule, the epiglottis, the aryteno-epiglottidean folds, and the arytenoids are chiefly affected. The true vocal cords are not usually involved, neither are the structures below them.

The symptoms generally begin suddenly; there is a feeling of discomfort and tension in the larynx and throat, together with hoarseness and loss of voice, and the inspiratory act is accompanied with a stridulous sound. Slight dyspnœa follows, and, unless the condition is relieved, soon becomes urgent, with cyanosis and orthopnœa, which will speedily be followed by symptoms of asphyxia. If the finger be introduced at this period, it is probable that the swollen epiglottis, the aryteno-epiglottidean folds

and arytenoids will be felt. But, if possible, the laryngoscope should be employed, and then a more perfect knowledge of the condition and of its cause may be obtained.

Treatment must be prompt and energetic. All the measures already indicated as valuable in acute laryngitis may be employed, and in addition, free scarification of the œdematous tissues must be carried out by means of an appropriate instrument. Tracheotomy may be necessary if other measures are not successful.

DYSPNŒA IN CHILDREN

NOTHING is more difficult than to determine the exact cause in a given case of dyspnœa in a young child, especially when under two years of age. Cases often occur in which, during the night, an infant or young child is suddenly attacked with a most urgent dyspnœa, showing itself by orthopnœa, cyanosis, and extreme retraction of the lower chest-wall. Under such circumstances it may be, and often is, perfectly impossible to form a definite diagnosis. There is so much confusion due to the indiscriminate use of the terms "false croup," "acute laryngitis," etc., that it is very difficult to have clear ideas on the subject unless the terminology is rendered more definite and less ambiguous. That acute laryngitis, entirely unconnected with diphtheria, may arise suddenly in a previously healthy child is, of course, true; but it is a rare occurrence. That diphtheria of the larynx may also supervene suddenly is also true, and it may give rise to symptoms indistinguishable from those of acute laryngitis or œdema of the larynx. But much more often the dyspnœa of diphtheria is of gradual onset, only causing grave and urgent symptoms after the lapse of some time, during which the child, obviously ill, has been manifesting greater and greater impediment to laryngeal respiration. It must not be forgotten, too, that papilloma of the larynx may occur, and give rise to no evidence of its presence until a slight laryngeal catarrh, however induced, supervenes, when the most urgent symptoms may ensue, and that with the greatest rapidity. We recall a case of this kind in the person of a boy of four who, perfectly well previously, suddenly became the victim of most intense

dyspnœa. He was immediately brought to hospital, and it was thought that the child was suffering from laryngeal diphtheria. Tracheotomy was deemed necessary, owing to the urgency of the dyspnœa; the operation was performed, but some days later the child died from lobular pneumonia. No membrane came up through the tube. At the post-mortem examination, it was found that a papilloma was seated on the right vocal cord in its whole extent. It appeared that shortly before the commencement of the dyspnœa the child had been walking about the room with bare feet. It was in the month of February, and in this way doubtless the laryngeal catarrh was set up, which, by the swelling of the mucous membrane, caused such occlusion of the already narrowed glottis as to be incompatible with life. The record is interesting and instructive, as showing the extreme difficulty of diagnosis in these cases; and also the latency, as regards symptoms, of papilloma of the larynx in some instances.

There is a peculiar functional affection of the larynx, of spasmodic character and entirely unconnected with inflammation, but which, when it does occur, is almost invariably associated with rickets. This malady is known by the name of *laryngismus stridulus*. Enormous numbers of attacks may occur within twenty-four hours, and they are generally worse during the night. This affection, though the prognosis is in most cases favourable, is by no means devoid of danger; and children who are affected with the malady may die suddenly from asphyxia or from an attack of convulsions, which not infrequently follows the paroxysm of dyspnœa. It may be stated, as regards the difference between this affection and diphtheria, that the onset of dyspnœa is on the whole sudden in laryngismus, gradual in diphtheria. Thus a sudden attack of embarrassed breathing occurring at night is more probably due to the former affection than to the latter.

As regards the distinction between the dyspnœa of diphtheria and that due to simple laryngitis, or the so-

called croup, it is in many cases impossible to differentiate between them. The only safe rule is to treat all cases as if diphtheria were present, by isolation, and, if thought desirable, by the injection of antitoxin. We may say at once that we do not believe in the existence of a membranous croup apart from diphtheria. To act practically as if such a distinction really existed would be to court disaster. The absence of membrane from the fauces is no evidence whatever against the diphtheritic nature of the case, for in children under two it is most exceptional to find membrane in this situation under any circumstances. At this age, and in many cases at a more advanced period of life, the diphtheritic process is often limited to the larynx, trachea, and bronchi. In all cases of dyspnoea the urine should be carefully examined for the presence of albumen. Its presence would certainly be corroborative evidence of the case being one of diphtheria. The aspect, too, should be carefully noted; diphtheria always produces marked symptoms of depression and weakness. Lastly, the temperature is of importance; a temperature but slightly febrile points, if other evidence exists, strongly to diphtheria.

INNOCENT TUMOUR OF THE LARYNX

TUMOUR of the larynx causes more or less aphonia and hoarseness. Should the growth, either by its size or situation, tend to obstruct the entrance of air, of course dyspnœa more or less urgent will supervene. Under these circumstances the breathing will become stridulous, and sooner or later signs of suffocation will ensue. But frequently symptoms remain for a long time limited to those first mentioned, namely, hoarseness and aphonia. The onset, however, of an acute laryngitis, in whatever way acquired, may be sufficient to cause serious obstruction, and the most urgent symptoms may thus develop as the result of a chill, rendering the operation of tracheotomy necessary. In children, under such circumstances, the occurrence of acute dyspnœa may lead to the diagnosis of laryngeal diphtheria. As mentioned in the last article, we have seen tracheotomy performed upon a child of four years old, under the belief that the urgent dyspnœa from which he was suffering was due to diphtheria. At the post-mortem examination, however, no trace of the disease could be found, but a tumour of the vocal cord was present which was about the size of a small pea. In addition to this, the larynx was the seat of acute catarrh. The history of the case showed that no symptoms referable to the growth had ever been noticed; but the acute inflammation, in addition to the presence of the papilloma, had been sufficient to cause the severe symptoms for which tracheotomy was required. Such a case is very instructive, and shows how impossible it frequently is to be certain of the exact conditions causing acute obstruction of the glottis.

Innocent tumours of the larynx are generally papillomata. Other growths of benign nature occur, however, such as cystomata, lipomata, myomata, fibromata, etc. Papillomata are met with in early life, and are often multiple; indeed, the larynx is sometimes full of such growths. Papillomata generally occur in the anterior part of the larynx, and are attached to the vocal cords. But they may be situated elsewhere. They are not, however, found in the interarytenoid commissure. Examination with the laryngoscope alone enables a satisfactory diagnosis to be made; the tumour has a pale, pinkish colour. It moves with inspiration, and has an uneven outline.

The only efficient treatment is the removal of the growths by the forceps, of which various kinds have been invented for the purpose.

CANCER OF THE LARYNX

THE form of cancer most frequently met with in malignant disease of the larynx is epithelioma, but other varieties are also liable to attack the organ. The growth is most usually observed on the aryteno-epiglottidean folds or ventricular bands, but it may occur in any part of the larynx; the latter may also be involved secondarily in the course of malignant disease in its neighbourhood, such as that affecting the neck, the œsophagus, etc. As in other cases of cancer, heredity seems to play an important part in the causation of the disease.

One of the earliest symptoms is weakness and alteration of quality of the voice, which impairment may soon become complicated with dyspnœa. The dyspnœa is often accompanied with inspiratory stridor. As these symptoms gradually develop, it is noticed that the general health is becoming seriously impaired; loss of flesh is marked, and the appearance of the patient is sallow and unhealthy. In the case of cancer arising within the larynx, the tendency to implication of lymphatic glands in the neck is not very great; but enlargement of these glands should always be looked for, as, if found to be present, it strongly tends to confirm the diagnosis of malignant disease. As the malady progresses, an offensive muco-purulent discharge appears, which may from time to time be blood-stained. Pain is often complained of, and may be severe; it is usually most acute during the act of swallowing.

The laryngoscopic appearances in the earlier stages of the malady are not characteristic; it is, indeed, often impossible at this stage to decide between cancer and syphilis. At later periods of the disease, when ulceration and peri-

chondritis are present, and the larynx is greatly altered by the presence of the new growth, it is comparatively easy to distinguish the nature of the malady. When the character of the discharge and the other factors of the case are taken into consideration, there can be no difficulty in making a diagnosis. At an early stage an important and suggestive sign, when present, is a marked want of mobility affecting both muscles and articulations, as seen in the laryngeal mirror.

The disease being incurable, all that can be attempted in the majority of cases is relief of symptoms and the prolongation of life. Morphia or cocaine may be used as insufflations, or in solution, to relieve pain. Disinfecting washes for local application may also be required. Tracheotomy will almost certainly be necessary during the progress of the case. Endo-laryngeal operations for the removal of the growth have been undertaken, but with qualified success only.

Extirpation of the larynx has been performed either wholly or in part. The results of this operation have been far from encouraging; and, even if the measure itself has been successful in a few cases, the disease has returned.

SYPHILIS OF THE LARYNX

SYPHILIS in any of its stages may affect the larynx, but in by far the larger majority of cases it is in the later stages of the disease that the organ is seriously attacked. Very rarely, indeed, has the primary lesion been seen in the laryngeal cavity, but in its secondary stage the disease is more commonly met with in this locality.

Secondary syphilis shows itself in the larynx in the form of catarrh of the organ, in some cases associated with slight ulceration ; or condylomata may be present. Under such circumstances it may occur during the first or second year of the malady ; but the most numerous, and by far the most serious, cases are those in which the disease first involves the larynx many years after the primary lesion. Ten, twenty, or even thirty years may be found to have elapsed since the patient suffered from the initial symptoms, and the memory of such may have entirely passed away from his mind. The characteristic laryngeal lesion is the gumma, and the softening of this leads to perichondritis, deep ulceration, and to extensive destruction of cartilage. Nature endeavours to rectify this mischief by the abundant formation of new fibrous tissue, but unfortunately this tissue has a great and constant tendency to contract, and, as a result of this contraction, much stenosis and deformity result, causing the most serious symptoms, and often endangering life itself. The epiglottis, in tertiary syphilis of the larynx, is often totally destroyed.

The symptoms vary, of course, with the stage of the disease. In the mild secondary phase they are practically those of chronic laryngitis, which lesion is indeed always present. In the more severe secondary, and in the ulcerating tertiary stages, the symptoms are much more marked

and serious ; loss of voice, pain, urgent dyspnœa, and wasting are all present at some period of the complaint. In such cases sudden œdema of the larynx may ensue, and, unless tracheotomy be performed, may carry off the patient. The same operation may be, and often is, rendered necessary on account of the contraction of the new-formed fibrous tissue causing stenosis, to which accident reference has already been made.

It will thus be seen that tertiary syphilis of the larynx is a very serious malady, of which the prognosis is extremely unfavourable. The laryngoscopic examination will show the presence of catarrh, of condyloma, or of ulceration ; and in the later stages very marked disorganisation and stenosis are observed, so that there can be no difficulty in forming an opinion as to the nature of the disease.

Whatever the stage of the malady, appropriate constitutional treatment should be begun as early as possible. In addition, if there is ulceration in the secondary stage, benefit will frequently accrue from the local application of solution of nitrate of silver, iodoform, or other astringents and disinfectants. In the tertiary stage of the disease large doses of iodide of potassium with liquor hydr. perchlor. should be administered.

It is well, however, to bear in mind that, in those in whom the idiosyncrasy exists, iodide of potassium will occasionally cause inflammatory swelling of the mucous membrane of the larynx. If the passage be already narrowed by fibrous contraction, it will be readily understood that a catarrh of the mucous membrane may cause dangerous stenosis, or even suffocation. Hence iodide of potash should be used tentatively at first.

Operative treatment will be required in those cases in which cicatricial contraction has caused deformity and stenosis. Indeed, it is very probable that, at some period or another in the course of the disease, tracheotomy will, under any circumstances, be necessary. Inunction of mercury can occasionally be employed with favourable results.

TUBERCULAR LARYNGITIS

IN cases of phthisis it is quite usual to meet with affections of the larynx, and in this disease the voice may for long periods be hoarse and weak. Such conditions are due to ordinary laryngeal catarrh, and have little in common with the affection now to be described. This is a true laryngeal tuberculosis, involving the mucous membrane itself. In nearly all cases of tubercular laryngitis there is evidence of similar disease of the lungs, though not seldom the laryngeal affection precedes the appearance of pulmonary physical signs. It is, indeed, doubtful if in any case the lungs are unaffected in this disease; and it must also be borne in mind that, even when morbid changes in the lungs are present in laryngeal tuberculosis, the physical signs to which they give rise are often not as evident as is usually the case. To this peculiarity is probably due the opinion, sometimes expressed, that the larynx may be alone the seat of tuberculosis.

The early symptoms of the disease are loss of voice and hoarseness; in fact, those of laryngeal catarrh. But when ulceration supervenes the symptoms are much more severe, cough and hoarseness become marked, and dyspnœa may be urgent. But the chief and most terrible symptom is the great and increasing difficulty in swallowing. This may be so marked that neither solids nor liquids can be taken; the condition of the patient under such circumstances is truly pitiable. The prognosis of the disease is extremely unfavourable; death is the inevitable termination of the malady, and palliation of suffering is all that can be attained by treatment. Necrosis of the laryngeal cartilages

is not uncommon in this affection, and may lead to death from suffocation.

Laryngoscopic examination at an early period of the malady shows abnormal pallor of the mucous membrane. Sometimes, along with this pallor, hyperæmic patches may be observed in different localities. The definite signs of the disease are most evident in the arytenoids, the inter-arytenoid commissure, and the ventricular bands. The arytenoids generally show symmetrical swelling, so that in appearance they somewhat resemble sugar loaves. The inter-arytenoid commissure becomes greatly thickened and swollen, and forms, with the enlargement of the arytenoids, a very characteristic picture in this disease. When ulceration has taken place there is seldom any difficulty in making a diagnosis; the ulceration is neither deep nor excavated; there is still a tendency to swelling of the mucous membrane, and discharge is moderate in quantity. Taken in conjunction with the history of the case, and with physical signs in the chest, there can be no difficulty in arriving at a conclusion as to the nature of the case. In the early stages of the malady the epiglottis is often characteristically swollen, and assumes the shape of a turban—the so-called “turban epiglottis”; but later on there is great tendency for it to be attacked by ulceration, and it may finally be almost entirely eaten away. This tendency to destruction of the epiglottis leads to the development of the distressing symptoms attending the act of swallowing to which reference has already been made.

It must never be forgotten that laryngeal tuberculosis is a local manifestation of what is, in reality, a general disease. Hence the too exclusive attention to the larynx is unwise, and may be injurious to the patient. Locally means should be adopted to relieve pain, and thus to enable the patient to swallow; nothing better attains these ends than the use of morphia, or cocaine, or of orthoform in the form of laryngeal insufflations. Lactic acid has been greatly praised as a local application in this disease; its effects are

very doubtful, and we have never seen any lasting good result from its employment. The same remarks apply also to the use of menthol in olive oil. In all cases the general health must be attended to, and the treatment proper to phthisis must be initiated and steadily persevered in. When difficulty in swallowing is severe, the patient can sometimes take food with less discomfort in the prone position.

LARYNGEAL PARALYSIS

PARALYTIC affections of the larynx are best arranged with regard to the special muscles involved; they may be divided into those of the adductors and abductors. Complete *adductor paralysis* is nearly always of functional origin, and is the chief hysterical affection of the larynx. When examined by the laryngoscope it is found that, during phonation, the vocal cords do not properly approximate. An interval is left between them, which may include the whole glottis, or may be confined to the ligamentous or arytenoid portion of the same.

The symptom of this lesion is aphonia; the voice may not be above a whisper.

Prognosis is good in this malady, and treatment consists in the employment of those measures which are especially suitable to the hysterical condition, in addition to which faradisation of the larynx itself may be useful.

Anæsthesia of the larynx sometimes occurs; it may be consecutive to an attack of diphtheria, or may arise in the course of glosso-labio-laryngeal palsy. It is a serious affection, as suffocation may occur from the passage of food into the larynx, which may happen without the patient's knowledge. Dysphagia and anæsthesia of the larynx are usually combined. Not seldom in hysterical affections of the larynx its mucous membrane is found to be anæsthetic; the prognosis in such cases is favourable.

Hyperæsthesia of the larynx is seldom met with, and then usually in connection with hysteria.

Double abductor paralysis is due to weakness of the crico-arytenoideus-posticus muscles, and is caused generally

by injury, syphilis, or by affections which give rise to pressure on the recurrent laryngeal nerves. It is a very serious affection, as the glottis cannot be properly opened in inspiration, and hence death from suffocation may ensue. On examination with the laryngoscope, the vocal cords will be seen not to move on inspiration, but to remain passive.

The symptoms are marked inspiratory stridor and dyspnoea, which may become exceedingly urgent. The treatment is that of the lesion on which the condition depends; but there is seldom the possibility of removing this lesion, and in most cases tracheotomy is necessary.

Recurrent Laryngeal Paralysis.—A special form of abductor paralysis of one side is met with, and is usually due to pressure on the recurrent laryngeal nerve; it is most commonly observed on the left side.

It will be remembered that the right and left recurrent nerves run very different courses, and that the left recurrent is much more exposed to pressure and injury than is the right. Particularly is this the case with regard to its relation to the arch of the aorta, around which it runs, and it is therefore liable to be implicated in disease affecting this vessel, particularly aneurysm. Indeed, this is, *par excellence*, the form of laryngeal paralysis associated with aortic aneurysm, and this disease should always be suspected when left recurrent laryngeal paralysis is present.

On examination with the mirror, it is found that the affected vocal cord is fixed midway between full opening and full closing of the glottis. As this is the position of the cord in the dead body, it is known as the "cadaveric position."

It should be noticed that the opening of the glottis is not quite straight, but inclined to the affected side; that in its closing movement the healthy cord transgresses the middle line towards the cord which is fixed; and that, lastly, in the movement of closure the arytenoid of the sound side tends to move in front of that of the opposite side, so that

the *processus vocalis* of the healthy side advances just in front of the other.

The symptoms in this condition are hoarseness and loss of voice, without dyspnoea; the latter, if present, being probably due to the lesion on which the paralysis depends. When met with on the right side, abductor paralysis is generally due to the involvement of the right recurrent laryngeal in a pleural thickening.

The prognosis in abductor paralysis is serious; the treatment is unsatisfactory, inasmuch as the lesion is usually due to some disease which is incurable, such as aortic aneurysm.

Unilateral abductor paralysis is due, in the majority of cases, to injury to the muscle, syphilis, or is the result of nerve lesion. The appearances are similar to those of double abductor paralysis, but are confined to one side. During phonation nothing abnormal is distinguished, but on inspiration it is found that the affected cord does not move. The resemblance to the picture given by pressure on the recurrent laryngeal is striking, but in the latter the glottis is more or less oblique, and the sound arytenoid passes in front of the affected cartilage on phonation.

The symptoms are but slight; dyspnoea, if present, is but little marked.

Tracheotomy is not required in this condition, unless, as is occasionally the case, the remaining vocal cord becomes affected in a similar manner.

EXAMINATION OF THE CHEST

BEFORE entering upon a description of the different diseases affecting the lungs, it will be necessary to say a few words on the subject of the examination of the chest. Much needless confusion has been introduced into an otherwise comparatively simple subject by over-refinement and a tendency to specialise; the result has been that the learner is most unnecessarily discouraged, and spends more time than is needful in acquiring a knowledge, much of which at a later stage of his career he sees to be useless, and a hindrance rather than a help in practice.

In examining the chest, it is of the first importance to use the ordinary unaided means of investigation by the eye and hand before resorting to instrumental assistance. The stethoscope should never be used until a most careful examination has been made, and nothing must be allowed to escape observation; it will then be found that the information obtained by the stethoscope will in most cases be merely confirmatory of the knowledge already acquired. While speaking of the stethoscope, we take the opportunity of protesting in the strongest possible manner against the routine employment of the binaural variety. This modification has quietly almost usurped the place of its predecessor, the wooden instrument. The pernicious idea is widely spread, especially amongst students, that the binaural stethoscope is the only one of real value; the very opposite is the truth, and it is to be feared that, if the use of this most unsatisfactory instrument is persisted in, a school of practitioners will arise which will do no credit to the art of auscultation, and which will be remarkable only

for incompetence. It is, further, undeniable that the use of the binaural stethoscope is fraught with danger to the hearing apparatus of the auscultator, and on this account alone its employment is most unwise. In our opinion the use of the binaural instrument by students should not be allowed.

The examination of the chest must be undertaken in regular order, and on a methodical system. First, the thorax must be inspected; in this way the eye will detect any abnormality in shape, or any unevenness of one or other side. Any difference in the movement of the lateral halves of the chest will be noted, and also any undue pulsation or prominence of veins. The next step is palpation; by this procedure the results of inspection may be confirmed or refuted, and pulsation or thrills may be felt and localised. Vocal fremitus, or the vibration of the chest wall communicated to the hand placed thereon while the patient speaks, also comes under the head of palpation. This vibration in health is fairly equal on the two sides, but may undergo modifications in disease which it is very important to appreciate. It is obvious that any change in the lung tending to cause consolidation of the same will make the organ a better conductor of vocal vibration. In this way the vocal fremitus will be increased over the affected lung area. On the other hand, should conditions be present by which the vibrations are damped, naturally the fremitus will be diminished.

The observer next proceeds to percussion. This is a most important proceeding, and requires much practice. By it information of the greatest value can be obtained. In percussing the chest no pleximeter is required; the fingers of the left hand, if the observer is right-handed, are more valuable than is any pleximeter of metal or ivory. It must never be forgotten that the value of percussion is relative, *i.e.*, is of use only as showing the identity or difference of the note elicited at corresponding spots on the two sides. In this sense the

slightest variations in the upper part of the thorax and over the apex of the lung are of the utmost importance, and the beginner should make it his aim to learn to appreciate the very smallest difference of percussive resonance between the two sides in this locality. He must not, at the same time, neglect to note the amount of resistance to the percussion shock which the finger applied to the chest experiences; with but slight difference between the two apices as regards resonance there may, nevertheless, be very considerable alteration in the resistance of the two sides. This point is one not sufficiently dwelt upon in teaching, but is of the greatest importance.

Lastly, and not until all possible information has been derived from the sources already referred to, should the investigator proceed to auscultation. It is clear that nothing can be learned from the examination by the stethoscope unless the auditor is familiar with the sounds of the healthy chest; he should, therefore, before entering the wards or the out-patient room, make it his business to acquire an accurate knowledge of breathing as heard in the normal subject over the apex of the lung, over the base of the same, over the root of the lung, and over the trachea. He will thus acquire a knowledge of what is understood by *vesicular*, *bronchial*, and *tubular* breathing. These words are of common occurrence in auscultation, and what they convey must be clearly understood; at the same time, it is best to say at once that no verbal description of the sounds is of the slightest service. An hour or two devoted to the examination of the healthy chest will give more information than can be obtained from months of reading; the student, therefore, may neglect to read the subject altogether, and will benefit by this omission.

It must be remembered that, just as with percussion, so with auscultation, the results on the two sides are comparative; differences are to be looked for and noted. There is no more to be said on the subject of auscultation of the breath sounds, except that there are certain portions of

the chest where vesicular breathing in health is the rule, and others in which bronchial breathing is always found in normal conditions. If bronchial breathing occurs where there should be a vesicular breath sound, then the condition is no longer a healthy one.

A few words should be added on the subject of the examination of the chest in children. In them percussion should be light, and the back should invariably be examined first. This is a most important rule, for if the examination of the back gives negative results, it is very unlikely that further investigation will yield definite information. The order of examination should also be changed, and auscultation practised before percussion. The reason is obvious; percussion is apt to elicit cries and resistance, conditions fatal to subsequent auscultation. In children, as a rule, both vocal fremitus and vocal resonance are absent, or, if present, are so slight as to be practically useless for diagnostic purposes.

We now proceed to consider the morbid sounds which are found in the chest when disease is present. Here, again, a quite unnecessary complexity has been introduced into a subject really very simple. Morbid sounds may be divided into two classes, *moist* and *dry*. The former are due to fluid in the tubes and alveoli; the air passing through this fluid gives rise to bubbles, which occasion the sounds in question. The latter are caused by thickening and dryness of the lining of the tubes through which the air passes; it may be in some cases that dry mucus acts as the reed of a wind instrument, thus causing a musical sound. Dry sounds are also the result of the friction of inflamed surfaces against each other. Lymph is thrown out, and the movements of the two contiguous surfaces are no longer noiseless, but effected with a more or less harsh, grating sound. Moist sounds are divided according to their size into *large*, *medium*, and *small*; the large sounds are also known as *gurgling* sounds. It is quite easy to understand that the size of the moist sound is really due to

that of the bubble, and this, again, to the amount of fluid and access of air. It may be said that the larger sounds are generated in cavities or large tubes, the medium in the middle-sized tubes, and the small in the ramifications of the bronchi and the alveoli. It is of some importance to recognise a certain quality of crepitation to which the term "consonating" has been applied. These moist sounds are characterised by a peculiar *timbre*; they are high-pitched and crackling, and when once heard are never again likely to be overlooked. Consonating crepitations indicate usually consolidation of lung; they are especially common in the inflammatory lung affections of childhood, and are of some diagnostic significance, both in these conditions and in tuberculosis. They are also, in some cases, indicative of the presence of cavity. Dry sounds generated in the bronchial tubes are *sonorous* when produced in the larger tubes, *sibilant* when in the smaller.

Looked at in this way, the whole subject of auscultation becomes simple. To the moist sounds the term *crepitation* has been applied, to the dry *rhonchus*; the former is a non-musical sound; the latter, on the contrary, has very often a musical quality. Thus we have *large, medium, and small* crepitation; *sonorous* and *sibilant* rhonchi. Friction sounds are liable to be confounded with moist sounds, and much practice is necessary before it is possible to pronounce an opinion in a given case. As a general rule friction sounds are double, they accompany uniformly both expiration and inspiration; this is not always the case with crepitations.

The auscultation of the spoken voice may be of importance; in health the sound conveyed to the ear is of the same quality and intensity on the two sides in corresponding positions; in disease, however, there may be very considerable differences in this respect. What has been said as regards the mode of production of differences in vocal fremitus applies equally to vocal resonance; and it is of importance to note that over the upper lobe beneath the

clavicle the vocal fremitus is often more marked on the right side than the left, and this in perfectly healthy conditions. The whispered voice may, in some conditions, undergo changes; it may assume a modified, high-pitched, metallic character, to which the term *pectoriloquy* has been applied. *Egophony*, again, is the term applied to the spoken voice as modified by the passage of the vibration through a layer of fluid; in this connection the voice may assume a peculiar bleating or squeaking character. It is a physical sign to which but little importance attaches, being often absent when all the conditions upon which it depends are in evidence. When, from breaking down of the lung-tissue, a cavity arises, certain more or less characteristic signs are produced, recognisable both by percussion and auscultation. It will be obvious that these signs will vary considerably according to the presence or absence of communication between the cavity and a bronchial tube. Should the latter freely communicate with the vomica, the percussion note will be more or less resonant; and it may be of that character which is known as "crack-pot," or "bruit de pot félé." This sound is supposed to resemble that obtained when a cracked vessel is struck, and the phenomenon is probably due to the sudden driving out of a quantity of air from the vomica into the tube. Not much reliance can be placed on this sign; it is frequently absent when undoubted cavities are present; and it can, moreover, be obtained on percussion of the chest of young children who are in perfect health. On auscultation over the cavity, very loud tubular breathing, with the addition of an element which is *sui generis*, may be audible; to this quality of breath sounds the term *amphoric* or *cavernous* is applied. Crepitation, or gurgling, if present, may also possess a more or less metallic quality. Should the cavity be closed, no crack-pot note may be obtainable, but only an unduly resonant one, and the breath sounds may be weak and wanting in the characters just alluded to. If cavities contain large quantities of fluid, dulness, which alters with

position, may be obtainable; but this is seldom the case. Whispering pectoriloquy is often audible over cavities of all kinds. It must be particularly observed that it is not possible to distinguish between cavities in the lung and dilated bronchial tubes by physical methods; the physical signs are identical in the two conditions.

HÆMOPTYSIS

SPITTING of blood is a symptom which may occur in many morbid conditions of the lungs and heart. In a large majority of cases it is an early evidence of phthisis, and it may be the sole indication that anything is amiss with the lungs. Thus it is not at all uncommon to meet with cases of profuse hæmoptysis in which the most careful examination reveals no physical sign of disease within the chest. As a rule, this form of hæmoptysis does not last long, and the prognosis as regards the loss of blood is favourable. But in the later stages of disease, when the blood comes from the wall of a cavity or from the ulcerative process extending into a blood-vessel, and still more when the hæmorrhage is due to the rupture of a small aneurysm in a cavity, the prognosis is extremely grave. It is, therefore, important to draw a sharp line of demarcation between the early and late hæmoptysis of phthisis from the point of view of prognosis.

Blood from the lungs is of light red colour and more or less frothy, and in this way can generally be easily recognised. It will be readily understood that spitting of blood does not by any means necessarily imply that the lungs are the source of the hæmorrhage. In cases of hæmoptysis there may be no pulmonary lesion, and on the other hand, pulmonary hæmorrhage may occur without hæmoptysis.

Spitting of blood may arise from a great variety of causes, apart altogether from pulmonary phthisis. It may come from the nose, mouth, or pharynx, or it may proceed from the stomach. It is thought by some that, in rare cases, hæmoptysis may be due to suppressed menstruation.

There is not the slightest real evidence in support of this view, and in many such cases it is by no means improbable that the hæmorrhage is factitious. Hysterical girls will adopt the most extraordinary means to excite interest in their complaints; we have frequently seen cases in which the gums and anterior portion of the mouth have been purposely scratched in order to induce hæmorrhage.

It will be obvious that the diagnosis of a given case of hæmoptysis may be by no means an easy task. In all cases it should be an invariable rule that the blood be seen by the physician. Without any desire to deceive, patients often make the most extraordinary mistakes in connection with the supposed spitting or vomiting of blood. Very often no blood at all is in question; in other cases, what is really hæmatemesis is mistaken for hæmoptysis, or *vice versa*. Again, not seldom in the case of young women the medical attendant may be the victim of deliberate fraud. Allusion has just been made to this subject, and we only revert to it in order to impress on the student the importance, in every case, of seeing the results of supposed hæmorrhage. In all doubtful cases a most careful examination should be made of the mouth, gums, and fauces.

Hæmorrhage may take place into the bronchial tubes or into the substance of the lung. In the former case it may arise from the walls of the tubes themselves, as in severe bronchitis, or when the mucous membrane is inflamed by the inhalation of irritating particles. Blood from the substance of the lung, from a pulmonary cavity, or from the congestion due to the presence of a tubercular mass, may find its way into the bronchi. Further, the bronchial walls may be attacked by malignant or other ulceration of the lung, and in this way blood may gain access to the bronchial tubes. Lastly, in those cases in which hereditary tendency to hæmorrhage exists, the slightest irritation may lead to abundant hæmorrhage into the bronchi. When extravasated into the pulmonary substance, the cause of the hæmorrhage is usually either pulmonary infarction,

due to greatly increased blood pressure in connection with dilated heart, or to embolism arising from the right side of the heart. In the former case a vessel gives way and the blood is poured into and around the alveoli; it forms a dark red mass, varying considerably in size, which is airless, and which sinks in water. One or several of these masses may be present. Hæmoptysis will ensue if the effused blood gains access to a bronchial tube, but this is not necessarily the case. In hæmorrhage due to embolism from the right side of the heart, the blocked area soon becomes gorged with blood, which may also be extravasated. The result is the formation of a mass similar to that just described. As the embolus is often septic, suppuration may ensue, and then a pyæmic abscess results.

Hæmorrhagic infarction and embolus may occur at any part of the lung, but are most usually observed in the lower lobes; they are often more or less pyramidal in shape, the base of the pyramid being towards the pleura. The latter is often distended over the contained extravasation, which can be readily detected both by the eye and by the touch, as it feels dense, firm, and airless.

All flurry and fussing should be avoided in the treatment of hæmoptysis, and the patient should be laid down in bed, free from the attention of anxious relatives, in a cool, quiet room. If the hæmorrhage be severe, he should be kept perfectly still and not permitted to either move or speak. Particularly is it necessary to protest against the pernicious habit of giving stimulants, which, by exciting the action of the heart, tend to keep up, and, indeed, to aggravate, the hæmorrhage. Small pieces of ice may be sucked, and an ice-bag applied to the chest; appropriate doses of ergot, gallic acid, and aromatic sulphuric acid may be given, and morphia hypodermically may be useful, especially if cough is troublesome. It is important that the bowels are kept freely open. Hæmoptysis, however, has a tendency to cease of itself, and too much reliance must not be placed on the supposed efficacy of drugs.

Hæmorrhage other than that due to phthisis is most usually caused by heart disease, in which compensation is lost, and is especially frequent in mitral stenosis. In such cases venesection is of great use as a temporary means of relief, and is clearly indicated by nature, whose efforts to lighten the work of the overladen right heart are the cause of the hæmorrhage into the lungs. In cases in which the hæmorrhage is due to a peculiar diathesis the usual styptics may be tried, of which, perhaps, turpentine is the best.

BRONCHITIS

THIS is a very common disease, being met with both as a substantive affection and as a complication of other maladies.

Symptoms.

The symptoms of bronchitis vary greatly in severity. In those cases in which the inflammation is confined to the larger and medium-sized tubes, they are not severe. In the early period of the malady, and before expectoration commences, there may be slight fever (99° to 100°), with pain in the limbs and *malaise*; but the chief symptom is troublesome, persistent dry cough, which irritates the patient greatly, is accompanied with constant tickling in the throat, and which keeps him awake at night. There is usually a sensation of roughness or rawness beneath the sternum, due to the accompanying tracheitis. Expectoration may be almost entirely absent, and, if present, is scanty and tenacious; but, after a day or two, the cough becomes looser, less irritating and painful, and is attended with spitting of frothy mucus. At this stage febrile symptoms, if present previously, disappear. The frothy expectoration tends to become muco-purulent. In the form of bronchitis under discussion the bubbles contained in the expectoration are all of a fair size, corresponding with the calibre of the tubes which are affected. If all goes well, the expectoration, after some days, tends to diminish, becomes quite muco-purulent in character, and finally both it and the accompanying cough cease; in fact, the patient is convalescent.

From the appearance of the expectoration it is easy to form an opinion, both as to the age and the gravity of the bronchitis. As just mentioned, when the bubbles are large,

it is clear proof that only the larger and medium-sized tubes are the seat of catarrh. Minute bubbles point to implication of the smaller and smallest tubes, and of the infundibula, a condition of things always serious, and sometimes extremely perilous to life. In these cases the symptoms are much more urgent; there is severe dyspnoea, even orthopnoea, the accessory muscles of inspiration work forcibly, and the face may assume a cyanotic tinge. There is clearly a considerable hindrance to the passage of blood through the lungs, and hence a serious strain is imposed upon the right side of the heart. In many cases the heart is unable to overcome these additional impediments, and death ensues from failure of circulation. And in bronchitis affecting the smaller tubes a great tendency exists for the inflammation to extend to the alveoli, with resulting lobular pneumonia. This extension is especially prone to occur in the very young and very old, as well as in those patients exhausted by acute or chronic disease. It is a most fatal complication at all ages, but particularly so in infancy and advanced life.

It has been already mentioned that in its earlier stages the expectoration of acute bronchitis is frothy, and has no mucopurulent appearance, the latter being met with only in the later stages of the malady, and in that very large class of patients in whom repeated attacks of bronchitis have led to a condition of chronic catarrh being set up. The history of these cases is usually that every winter for a number of years bronchitis has attacked the patient until at last he is never really free from the malady, not even in summer, at which season, it is true, remission often occurs, but not a satisfactory clearing up of the inflammatory process. As a result of the hindrance to the access of air to the lungs from the obstruction due to the inflamed mucous membrane, emphysema occurs, and nothing is more common in cases of chronic bronchitis than to meet with the high shoulders, well-developed accessory respiratory muscles, and barrel-shaped thorax so characteristic of the

emphysematous condition. Finally, the two maladies, bronchitis and emphysema, become so combined, acting and interacting, that neither can be said to be predominant.

In some cases of chronic bronchitis expectoration is very abundant, and it may also be offensive, the last condition being frequently associated with dilatation of the bronchial tubes. It must not be forgotten that bronchitis is not the sole cause of emphysema, which may undoubtedly occur apart altogether from bronchial catarrh. In such cases it would appear to be a degeneration coming on usually in middle life, and often associated with other organic changes of the same degenerative type. It may also be caused by constant playing on wind instruments, and is thus not seldom observed in those whose avocation it is to perform on the trombone, the cornet, etc.

In bronchitis percussion gives a clear note; inspiration and expiration are accompanied with dry sounds, known as rhonchus and sibilus, according to the size of the tube affected; and in many cases, at all events in the later stages, moist sounds (crepitations) are audible. As with the dry sounds, so also with those which are moist, their coarseness or fineness depends on the size of the tubes in which they are generated; hence it is of great importance to determine by auscultation what portion of the bronchial ramification is chiefly affected. In chronic bronchitis the dry sounds are nearly always more or less audible, and crepitations of various sizes may accompany them. In addition, there is usually great prolongation of the expiration, which may be three or four times longer than the normal. This prolongation of expiration is due to the accompanying emphysema. In these cases the patient is always more or less wheezy, has troublesome cough, and expectoration, with a full face and moist eyes. His cardiac dulness is more or less obliterated, a clear sound being elicited on percussion of the precordial region, and he is very liable to eventually suffer from dilatation of the right side of the heart.

The chief dangers of bronchitis have been already referred to ; but it is necessary to add that absence of cough and diminution of expectoration are of evil significance in acute cases, as is also absence of bubbles in the expectoration at a late stage of the disease. The least serious cases of bronchitis are those in which the cough is troublesome, and the expectoration frothy and abundant. Drowsiness, with very rapid breathing and slight cyanosis, are of very unfavourable import. In old people the symptoms just referred to point almost invariably to a fatal termination.

Bronchitis is perhaps more often met with than any other complaint. It is especially predisposed to in the very young and very old, and in those who are in a weak, debilitated state of health. It may be due to chill, and under these circumstances often forms part of a general catarrh. Irritation of foreign particles in the air, as occurs in some manufactures, will excite it. No case of pneumonia occurs without bronchitis being present, and the same remark applies equally to enteric fever. It occurs in cases of *morbus cordis* in which the compensation is lost, and is very commonly met with in renal disease.

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Thus it will be seen that there is scarcely a diseased condition which may not, at one or other period of its course, be accompanied by bronchitis, and in some diseases it is a most perilous complication. Independently of other morbid conditions, it may be a slight and trivial malady ; or it may directly imperil life, and in the aged it is always a serious affection.

The post-mortem appearances in the case of those dying from bronchitis vary considerably. It is surprising in many cases how completely signs of catarrh and of congestion of the bronchial mucous membrane may have vanished. On the other hand, it may be that the mucous membrane is of a deep red colour, swollen, and covered with frothy or tenacious secretion. In the smaller tubes this state of things may lead to complete occlusion, and consequent collapse of lung. But by artificial inflation it will be

possible to restore the portion of lung to its normal air-containing condition. The contents of the bronchial tubes are sometimes muco-purulent, and may be fœtid. When the bronchitis is chronic, more or less emphysema will certainly be present, the evidence of which will be especially marked at the edges of the lungs. More or less œdema of the pulmonary tissue generally attends bronchitis. In chronic cases it is quite usual to find the right side of the heart enlarged, and the liver in such condition is not infrequently congested, presenting the appearance to which the term "nutmeg" is applied.

Histologically it is found that the ciliated epithelium covering the mucous surface is to a greater or lesser extent shed. The mucous membrane and the sub-mucous tissue are swollen, and are found to be infiltrated with very numerous leucocytes. The mucous glands are also deeply involved in the inflammatory process. They are swollen and filled with secretion, the latter being discharged in large amount. The secretion covers the mucous membrane and presents the different features which have already been described. In very chronic cases minute ulceration of the mucous surface may occur, and in such conditions the mucous membrane becomes replaced more or less by a new fibrous tissue.

Treatment.

In the mild forms of bronchitis little is required beyond rest in bed in a room of a temperature at or about 62° or 63°, together with light, nutritious food. This mode of treatment also applies to those cases in which the bronchitis is part of a general catarrh, such as that known as "cold in the head," which has a great tendency to extend to the trachea and bronchial tubes. In more severe cases the same treatment must be adopted, but in addition, benefit will result from inhalations of steam to which various ingredients may be added. Perhaps the best of these is the compound tincture of benzoin of the pharmacopœia. But there are numerous others which may be useful under certain circumstances, though it is more

than doubtful if they possess many of the properties attributed to them in therapeutic works. The same remark applies to the whole class of so-called "expectorants." It is a fallacy to suppose that it is possible to anticipate the action of nature by administering such drugs. Because expectoration follows when a drug has been taken, this does not by any means prove that the result is due to the medicine. As in most questions respecting the action of drugs, the *post hoc* and the *propter hoc* are confounded. But there can be no doubt that if the so-called "stimulant expectorants," *e.g.*, carbonate of ammonia, or senega, are given during the dry stage, and before secretion is well established, the patient is made worse. He becomes hot and uncomfortable, and his cough more troublesome, in addition to which his digestion, already upset, becomes still more deranged. It should be made a rule, therefore, during the febrile stage and during that of dry catarrh, that only salines be given. Citrate or carbonate of potash are agreeable to the patient, or he may take effervescing draughts, which are also usually grateful. At a later stage, and when expectoration is fully established, the "stimulant expectorants" may be administered without harmful effect, but in most cases of acute bronchitis they are better omitted. Minute doses of opium have more effect in quieting the cough when this is troublesome and keeps the patient awake at night. Appropriate doses of compound tincture of camphor will answer the purpose. But whenever the cough is ineffective, or much secretion is present which is with difficulty got rid of, or if cyanosis be coming on, then opium in any form is most dangerous. It should be entirely withheld, as by its sedative action it still further narcotises the respiratory centre already suffering from the effects of the imperfectly aerated blood. In severe cases, when the right heart is labouring, and can with difficulty get the blood through the lungs, venesection is of great value. A timely bleeding may save life under these circumstances.

In all cases of bronchitis it is well not to load the chest with heavy poultices. The embarrassment of the respiratory muscles is increased, and the good results of the application are thus more than neutralised. A jacket of cotton wool is all that is required. In the more chronic forms stimulating liniments are useful, such as that of turpentine. In chronic cases aromatic stimulating remedies, such as terebene, have been recommended. Doubtless these drugs produce a feeling of comfortable warmth, but it is very questionable if they have any other effect.

In chronic cases cod-liver oil is of use; and we think we have seen some favourable results accrue from the administration of iodide of potassium in small doses, especially in those cases in which there was a tendency to paroxysms of dyspnoea, resembling asthma. In every instance attention to the regularity of the bowels and to the diet is of the greatest importance. Climatic indications are not to be neglected, and in chronic bronchitis a winter residence should, if possible, be chosen in a more favourable climate than that of England.

EMPHYSEMA

THE symptoms of this malady, which depends upon an affection of the lung parenchyma, by which the divisions between the air-cells are to a greater or less extent obliterated, are so closely connected with those of the bronchitis which almost invariably accompanies and causes it, that to recapitulate them is merely to repeat what has already been said concerning the symptomatology of bronchitis. Symptoms.

But cases are met with from time to time in which emphysema develops as a degenerative change, and independently of bronchial catarrh; further, between successive attacks of bronchitis the emphysematous condition persists as a substantive affection.

The typically emphysematous chest is seen in the victim of true asthma. The chest is barrel-shaped, it being more or less fixed, as it were, in the position of full inspiration; and when directed to take a deep breath the patient is unable to much increase the capacity of the thorax. The shoulders are high, the accessory muscles of respiration are well developed. The face is full, the eyes moist, and the minute vessels of the nose and cheeks often injected. The complexion may be dusky, and the lips cyanotic.

The patient complains of intense shortness of breath, much increased on exertion, and of inability to lie low in bed; when the case is a severe one, the latter symptom may be so urgent that the patient cannot sleep unless the head and shoulders are greatly raised. There is, further, a great tendency to contract an attack of bronchitis on the least

exposure, or even apart from any indiscretion of this kind.

The embarrassment to the circulation of the blood in the lungs throws a constant and increasing strain upon the right side of the heart. For this reason, in advanced stages of the disease failure of compensation of the right ventricle may cause swelling of the lower extremities, "nutmeg" liver, and the whole train of symptoms which are so characteristic of loss of compensation in the case of valvular heart disease.

On percussion of the thorax in emphysema, it will be found that the chest is generally hyper-resonant, and that the superficial cardiac dulness is more or less obliterated. For this reason the apex beat of the heart cannot be made out, and it is impossible to determine the size of the cavities of the organ. On auscultation marked feebleness of the breath sounds will be detected, inspiration being perhaps scarcely audible, while expiration is considerably prolonged. But in most cases more or less bronchitis accompanies the emphysema, and for this reason it is quite usual to hear sibilant and sonorous rhonchus attending the breath sounds; the prolongation of the expiration is then particularly evident, it may be two or three times longer than inspiration.

In some cases a marked network of veinules, roughly corresponding with the insertion of the diaphragm, may be present on the cutaneous surface of the lower portion of the front and sides of the chest, and not seldom the cardiac pulsations may be clearly seen and felt in the epigastric region. Cough is not a prominent symptom in pure emphysema, but is, nevertheless, very often complained of, being due to the associated bronchitis. It is not unusual for evidence of atheroma to be detectable both in the radial pulse and in the temporal artery.

The prognosis of emphysema is unfavourable; sooner or later the right side of the heart gives out, and death ensues from failure of compensation. Or the patient may die from

associated bronchitis, or from those maladies with which emphysema is frequently linked, *e.g.*, atheroma or chronic renal disease.

It has been already mentioned that the most usual cause of emphysema is bronchitis, owing to the obstacle imposed by the latter to the entrance of air to the infundibula and air-cells, as well as to the impediment to the pulmonary circulation which it causes. And when repeated attacks of bronchitis have occurred, a condition arises in which bronchial catarrh and emphysema mutually act and react, each predisposing to the other. In this way, after a few winters, during which the patient has suffered from constant cough, a marked emphysematous condition arises, and gradually becomes more severe.

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But emphysema may occur independently of bronchitis as a senile and degenerative change ; such a condition may ensue in connection with a tendency to gout and to chronic renal disease. It may also develop as the result of habitual expiratory effort, and is thus often seen in professional performers on wind instruments. And true asthma invariably leads, in process of time, to the appearance of emphysema, from the greatly raised pressure upon the interior of the air-cells, which is the result of the asthmatic paroxysm.

The morbid anatomy of emphysema consists essentially in the breaking down of the septa between the air-cells and the consequent fusion of these cells with one another, producing large bladder-like elevations which are grey in colour, thin walled, and stand out prominently from the surface of the affected lung, being especially well developed and conspicuous at the edge of the same. It is obvious that the disappearance of the septa dividing the air-cells involves that of the vessels contained in the latter, the blood enclosed in these vessels being, of course, subjected to the action of the air contained in the cells. It is this disappearance of the ultimate ramifications of the pulmonary artery which causes that impediment to the

circulation through the lungs to which reference has already been made, leading as it does to the gradual onset of those changes affecting the right heart which are so disastrous in their results.

The remaining appearances include dilatation of the auricles and ventricles of the heart and degeneration of its muscular wall, together with the consequences they entail, and those changes characteristic of bronchitis, a lesion which so constantly attends the development of the emphysematous condition.

Treatment.

This can be dismissed in but few words. In the great majority of cases of emphysema the treatment is that of the chronic bronchitis to which the malady owes its origin. In all cases the greatest care should be taken to avoid the risk of attacks of bronchitis, and generally this risk can only be evaded by wintering in a climate, such as that of Egypt, in which the air is dry and the temperature mostly uniform. When emphysema is the result of degenerative changes affecting the lungs, the same precautions must be observed to avoid bronchitis; and, in addition, all possible measures must be taken to arrest the progress of those changes upon the presence of which the morbid process in the lungs depends. Iodide of potassium may be of use in this sense; so may cod-liver oil. In every case attention to the state of the digestive system is of the utmost importance, and the diet should be nourishing and easily assimilable.

BRONCHIECTASIS

THE presence of dilated bronchial tubes is not usually attended by very characteristic symptoms. Perhaps the most important of these symptoms is a tendency to periodical emptying of the cavity or cavities. Not infrequently, at a certain definite time each day, the patient coughs up a large quantity of muco-purulent secretion, often very offensive in odour, and then for the next four-and-twenty hours no expectoration occurs. This is the most characteristic symptom of dilated bronchus; in other respects the physical signs are those of pulmonary cavity. Cavernous breathing may be audible over the dilatation, together with splashing sounds, and pectoriloquy is frequently obtainable. Symptoms.

In some cases, owing to the accumulation of foetid matter in the dilated bronchi, the temperature may rise, and septic symptoms ensue. Frequently vomiting occurs, and in this way the cavity is emptied of its contents, to the great relief of the patient. Should fever, which is really unconnected with lung disease, ensue in a patient the subject of dilated bronchi, it is not at all unlikely that, if no other obvious cause for the temperature exists, the physical signs may be mistaken for those of pneumonia. This is especially apt to be the case when the patient is seen for the first time, so that the previous condition of the chest is unknown.

Bronchiectasis occurs, especially in children, as the result of chronic bronchitis, and particularly in connection with measles. The dilatation is most often found in the lower lobes, but it may occur at the apex; the mucous membrane Causation
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lining the dilated bronchus is sometimes unaltered ; it may, however, be ulcerated as the result of the irritation of the contained secretion on the weakened bronchial wall. The affected lung is often dense and hard, due to the development of new fibrous tissue, and on making a section across the diseased area the dilated bronchi are at once noticed as long tubes tapering at their distal end, and usually filled with frothy or muco-purulent secretion. The walls of the dilated tubes are obviously thickened, and are surrounded by fibrous tissue which gives to the lung the abnormal toughness already referred to. In some instances the dilatation is moniliform, and the enlarged areas may form small separate cavities ; in many cases the walls of the tubes are found to be ulcerated. The distribution of the dilatations is often symmetrical, but sometimes it is confined to the tubes of one lung.

Histologically the appearances are those of chronic inflammation, with much resulting fibrosis, and when ulceration is present the ordinary appearances associated therewith are found : destruction of the mucous membrane, with exposure of the deeper structures.

Treatment.

This must be conducted on general principles. Bronchiectasis is a disease which complicates other pathological conditions, and its treatment must therefore be that of the malady with which it is associated. The occasional administration of an emetic may have a salutary effect from the clearance of the cavities which results. Cod-liver oil is often of value, and nutritious food, together with favourable hygienic and climatic surroundings, are of the utmost importance. The fœtor may often be diminished by inhalations of creosote or other antiseptic. Under any circumstances, and at all ages, the prognosis is unfavourable, and especially is this the case with children.

LOBAR PNEUMONIA

LIKE pleurisy, pneumonia is frequently caused by exposure to cold and wet. But there is a considerable body of evidence to prove that lobar pneumonia is a general disease, of which the signs in the lungs are the local expression. It is well known that in certain cases of pneumonia the physical signs are delayed in their appearance, and in others, although all the usual symptoms of pneumonia are present, no physical signs appear at any stage of the disease.

Probably we at present confound diseases really essentially different. It is extremely probable that inflammation of the lung may ensue as the consequence of exposure, and that a similar pathological condition of the organ may result as the expression of what may be described as a specific fever. In this connection it is important to note that cases are on record in which there can be no doubt that the disease has been communicated from patient to patient, this infectious mode of progress further tending to support the opinion that pneumonia may be a fever pure and simple.

Inflammation of the lung may ensue in the course of other maladies, such as phthisis and renal disease, and is also observed as the result of injury; but with these forms of the affection it is not our intention at present to deal. As a rule, the illness commences more or less suddenly, and with a well-marked rigor; following the rigor, lassitude and loss of appetite are noticed, and the patient generally takes to his bed. He complains of shortness of breath and usually of troublesome cough, and there may be pain in the affected side from associated pleurisy. The temperature rises at

onee, and is quite commonly 103° or over at the commencement of the malady. The pulse respiration ratio is altered; instead of four to one, it may be three or two to one. Appetite is lost, the tongue thickly coated, and there is generally constipation. The urine is usually scanty and loaded with urates, and often deficient in, or entirely free from, chlorides. It is quite usual to meet with a trace of albumen. There is often nocturnal delirium, and if the patient has been a drinker, the nervous symptoms may manifest themselves in a manner indistinguishable from that of *delirium tremens*. A crop of herpes often appears on the lips. Examination of the blood may reveal markedly increased leucocytosis, and the higher the temperature the greater is the increase in the number of the leucocytes.

The patient remains in the same condition, but with increasing weakness and dyspnoea, until the day of the crisis. The date of this important event varies considerably, and there is but little agreement amongst observers as to the day on which the crisis most frequently occurs. It may be from the sixth to the ninth day; perhaps the seventh is one of the commonest. The crisis is often attended by profuse sweating, or by severe diarrhoea; temperature may fall several degrees, and this in a few hours. The change in the appearance of the patient is most marked; the anxious expression is quite lost, and he looks comfortable and happy. The dusky tint vanishes, and the dyspnoea disappears. He probably passes into a quiet sleep, and awakes much refreshed. The expectoration, which, during the height of the fever had been uniformly blood-stained, of gelatinous consistence and scanty, forming the so-called "rusty" expectoration of pneumonia, now becomes looser, free from blood, more abundant, and the symptoms of pneumonia give place to those of bronchitis. Convalescence is soon complete, but weakness may be observed for some time after the attack.

Such is a short sketch of the course of events in ordinary

lobar pneumonia, but in no disease is there a greater liability to assume manifold form and expression. It is important to be acquainted with some of the chief deviations from the usual course of the complaint. We have already referred to the fact that, in some cases of pneumonia, the physical signs are completely absent throughout; in another class the signs are merely delayed. Everything else may point to the nature of the disease, but for some days the physical signs may be wanting; then they appear, and run the usual course. Probably in such cases the consolidation is deeply seated, and not large.

As a rule the disease terminates in crisis, the temperature falling abruptly, and becoming normal in a few hours. In many cases, however, this sudden descent is not observed; the fall is gradual, resolution is by lysis. In many cases of resolution by crisis the critical fall is interrupted; the temperature, after falling, may rise again two or three degrees, and the true fall follows shortly after this rise. Again, the resolution may be delayed, even to the tenth day, and the pneumonia yet run an ordinary course. Later resolution than this generally means a complication, and an unfavourable issue. In some cases, attention is drawn away from the chest by the severity of the head symptoms; such cases of violent delirium are chiefly met with in alcoholic pneumonia.

The physical signs of pneumonia are those of condensed and solid lung. The most important evidence from physical signs is furnished by percussion and auscultation. The most usual site for these physical signs is the lower lobe; percussion in this region gives an altered note, and this may vary from a trifling rise in the pitch to complete dulness as compared with the sound side. The dulness is not of the same intense, absolute quality as is observed in pleurisy with effusion, neither is the sense of resistance to the percussed finger so well marked. On auscultation, any variety of bronchial breathing may be found, from that which is merely bronchial to the most complete and perfect

tubular breathing. At a very early stage of the consolidation fine, hair-like crepitation may be heard with inspiration; this is but a fugitive phenomenon, and soon passes away, leaving tubular breathing pure and simple. When resolution commences, the auscultatory phenomena change; tubular breathing gives way to bronchial, and later to vesicular breathing, and both inspiration and expiration are accompanied with abundant moist sounds (crepitations). The physical signs by auscultation at this stage are those of bronchitis.

During the stage of solidification it is natural to infer that both vocal fremitus and vocal resonance would be increased, and this is so. As convalescence proceeds, all the morbid signs gradually vanish, and the loss of resonance on percussion alone remains. This may continue for weeks, or even months, after the health is fully re-established, and no doubt when long continued depends upon thickening of the pleura from the accompanying pleuritis.

Pneumonia may eventuate in complete recovery; this is the usual termination in uncomplicated cases. Should unfavourable conditions of the general health be present it may not resolve, and chronic pneumonia may supervene. Under the same conditions the lung may break down, and the patient die from gangrene of the organ. Empyema is a not uncommon complication, especially in the pneumonia of children.

When occurring in the course of acute nephritis, pneumonia is always fatal.

Pneumonia affecting alcoholic subjects is a most fatal malady, and in such cases nervous phenomena are always present. Usually the nervous disturbance takes the form of active, busy delirium; the patient thinks he has work to do, a brother or other relative to meet, and that not a moment is to be lost in carrying out what he feels bound to perform. Not unfrequently furious delirium supervenes, and acts of violence to himself and others are only prevented by the exceeding weakness of the patient. In

other cases, again, the mental disturbance assumes that form of delirium, with hallucinations of sight, which is so characteristic of *delirium tremens*.

Marked leucocytosis is generally regarded as a favourable sign.

The pulse respiration ratio is a most important factor in diagnosis, and should be determined in all cases.

Duskiness, accompanied with profuse sweating and with tremor of the hands and facial muscles, is an unfavourable physical sign.

The physical evidences at an early stage (second or third day) may not show more than high-pitched percussion note, with distant, somewhat bronchial, breath sounds. But very shortly tubular breathing, crepitation, and marked percussion dulness appear in the same locality. The physical signs are particularly apt to be delayed in children, in some of whom they never appear from first to last, although the aspect, pulse respiration ratio, presence of labial herpes, and convalescence after crisis, all point out the nature of the disease. We have recorded details of five cases of this description in which local signs were entirely absent, while the general symptoms of pneumonia were fully developed, including a well-marked critical fall of temperature.¹ Such forms of the malady may, of course, be due to the fact that a strictly localised pneumonic patch is too deeply seated to give physical signs of its presence. On the other hand, it is equally or more probable that they are cases of a general disease, the so-called "herpetic fever," of which the lung lesion is the local expression, and which may be entirely absent, leaving only the general symptoms. These cases certainly support the contention of those who consider that pneumonia is a specific disease, dependent probably upon an organism, the *pneumococcus* of Friedländer.

Before any physical signs appear, the side opposite to the one affected not infrequently, when percussed, is found to

¹ Westminster Hospital Reports, Vol. II. p. 177. Five cases of pneumonia without physical signs of lung consolidation.

be hyper-resonant. This is a sign of some importance, and one not sufficiently noted.

CAUSATION OF PNEUMONIA, AND THE RELATIONSHIP OF
BACTERIA TO THE DISEASE

As has been already mentioned, there is great reason to believe that pneumonia is a general disease, the lung affection being merely a local expression of the malady, and one which is not invariably present. The fact that in some cases pneumonia is certainly capable of being communicated from patient to patient, when it arises without any exposure to its usual exciting causes, and the singularly definite course which the fever runs, ending in a critical fall of temperature, are certainly strongly in favour of this view. This being so, it is natural in these days that attention should be directed to the bacteriology of pneumonia, to ascertain, if possible, the presence of a micro-organism which might perchance be in some relationship, in a causal sense, to the attack of the malady.

A variety of micro-organisms have been detected, of which the *diplococcus* or *pneumococcus* of Fränkel is the most important. This micrococcus occurs in the sputum of pneumonia, and also in the affected lungs. It is an oval body, enclosed in a capsule, and the cocci usually occur in pairs (diplococci). It appears to be extremely variable in its forms, and its presence is by no means confined to the pneumonic condition. Indeed, it may be present in the saliva of perfectly healthy people, and it is met with also in the exudation of acute pleurisy, pericarditis, and other inflammatory conditions.

Another organism met with in pneumonia, but much less frequently, is the *bacillus pneumoniæ* (Friedländer).

It is not possible at the present time to say more than that this micro-organism is found to be present in cases of pneumonia; what its relationship, if any, to the disease may be is still an open question.

Many other kinds of micro-organism are also met with from time to time in the expectoration of pneumonia, such as the streptococcus or the diphtheria bacillus. The fact of these organisms occurring in a totally distinct disease should make us careful not to accept too readily the tendencies of the present day as to the supposed causal relationship of bacteria to disease.

In an early stage of pneumonia the condition is one of hyperæmia. The vessels are distended with blood, and effusion of fluid therefrom into the infundibula and air-cells gives rise to that fine, hair-like crepitation which, though rarely heard, is so characteristic of what is called the stage of engorgement in this disease. It is scarcely necessary to say that this condition is hardly ever met with at post-mortem examinations, as death does not occur at this period unless from some cause unconnected with the pulmonary inflammation. Morbid
Anatomy.

The appearances normally met with at autopsies are those which characterise the so-called stage of "red hepatisation," which passes insensibly into a later stage, that of "grey hepatisation."

In red hepatisation the affected portion of lung is airless; sinks in water, and its volume is increased. This increase of volume leads to pressure of the solidified lung against the adjacent ribs, and the marks of the latter are often well seen on the pleural surface. Acute pleuritis is never absent so far as the pleura covering the hepatised portion is concerned. The pleurisy is usually fibrinous only, but some fluid effusion may also occur. On section the surface of solid lung presents a finely granular appearance; it is very friable, breaking down under pressure of the finger, and in colour is of a mottled reddish-yellow or reddish-grey.

Histologically the air-cells and infundibula are found to be filled with fibrin, enclosing in its meshes red blood corpuscles in large numbers, and some epithelial cells and leucocytes. The capillaries of the walls of the air-cells are

swollen and tortuous. Such are the naked-eye and microscopic appearances of red hepatisation. There is no marked line of demarcation between the condition just described and that known as grey hepatisation; the two phases pass insensibly one into another. Also at post-mortem examinations it is quite usual to find a large portion of the affected lung in the stage of grey hepatisation, while a smaller, more recently inflamed portion is in the red stage only. Grey hepatisation differs from red merely in consistence, which is much softer; and in colour, which is a more or less uniform yellowish-grey. On pressure a purulent-looking fluid exudes from the affected area.

Histologically it is found that the alveoli are full of white cells, chiefly leucocytes, which are crowded together in enormous numbers. These cells press on the vessels, and the blood supply being deficient, fatty changes occur in them. This condition may in some cases pass into breaking down of the lung, whereby abscess results. Gangrene of the lung, which may also be a termination of acute pneumonia, is treated of in a separate article.

Treatment.

The treatment of lobar pneumonia consists mainly in feeding and nursing the patient. He should be placed in a well-ventilated, airy room, and his position in bed should be rendered easy and comfortable. The room should be darkened if it seems that sleep will be induced by such a proceeding. The patient should not be allowed to talk, and talking should not be carried on by those in the room in whispers. This practice, which is very irritating to patients, is too much in vogue.

At the outset an aperient should be administered, unless the bowels are freely open. Speaking generally, the less medicine given in this disease the better. No known drug will shorten the course of the malady or hasten the period of resolution; all drugs more or less upset the digestive system; and as it is of the highest importance that nourishment be taken, the already enfeebled digestive powers of the patient should on no account be further

weakened by drug administration. Particularly to be avoided are the modern antipyretics; we have never seen anything but harm result from their use. Should pleuritic pain be severe, warm fomentations, poultices, or the abstraction of blood by a couple of leeches will often afford relief.

In certain cases in which the right heart is overloaded, the pulse weak and flagging, and the patient cyanosed, life may be saved by a timely venesection. It is quite usual to see in such cases, after the removal of a few ounces of blood, the cyanosis disappear, the pulse improve in strength, and the patient drop off into a quiet slumber.

Opium requires caution in its use in this disease. If there is much bronchitis, it should not be employed, as under such circumstances it will probably cause a fatal termination. Stimulants should on no account be administered as a routine practice. Cases occur in which they are necessary, but in most none are required. The state of the pulse is the best guide to their employment. Should the breathing be further embarrassed by a large pleural effusion, paracentesis may be necessary. It is chiefly in the pneumonia of children that empyema occurs.

A careful examination should be made daily, and the possibility of the occurrence of empyema be never lost sight of. It must be treated by incision and drainage, not by aspiration. During convalescence, good food, fresh air, and a change to the seaside are all valuable. Quinine may in many cases be administered with advantage.

A few words must be added on the serum treatment of pneumonia.

It appears that immunity to the disease has been obtained in animals by the hypodermic injection of cultures of the pneumococcus. This immunity seems to last some months. And when the disease was actually present, it has been found that in some cases favourable results have followed the injection of serum, the latter being taken from an animal rendered immune.

It is scarcely necessary to say that far too little is known of the matter to justify such procedures in the human subject. It is by no means certain that the diplococcus *is* the cause of pneumonia, and it is very unwise to trust too implicitly to the results of experiments on animals. The zeal of the enthusiastic bacteriologist is apt to outrun his discretion in these matters, and hence many lamentable failures of highly lauded "immunising" injections.

LOBULAR PNEUMONIA

THE symptoms of lobular pneumonia are much less definite than those of the affection when occurring in the lobar form. The great distinction between them consists in the fact that lobular pneumonia is a disease always consecutive to bronchitis; it is not a primary malady like lobar pneumonia. Met with chiefly in children, it is due to an extension to the alveoli of the lung of inflammation of the bronchial tubes, and for this reason the term *broncho-pneumonia* is sometimes applied to it.

A patient the subject of lobular pneumonia has been in ill-health for some time before the attack; cough and shortness of breath have been present; if broncho-pneumonia develops, these symptoms are aggravated, the temperature also rising. At the same time, the general condition of the patient is obviously less satisfactory; he is weaker, paler, and the shortness of breath is more marked. Symptoms.

The temperature in lobular pneumonia shows no characteristic tracing, and is in this respect totally unlike that of lobar pneumonia. The highest point attained during the course of the affection may be 102° , 103° , 104° , or even a higher figure than this; but there is no certainty about the course of the fever, and the highest point may be reached at any time. Resolution does not take place by crisis, but by a gradual and quite irregular fall. Probably the erratic nature of the temperature curve is due to the successive involvement of different portions of lung tissue—one patch of consolidation resolves, and directly afterwards another patch is developed.

In children especially it is well to notice the indifference of the patient to physical examination. Whereas in many

febrile diseases this procedure is vigorously resented, in broncho-pneumonia, on the contrary, the child offers no resistance, does not cry, and seems more or less indifferent and lethargic.

The physical signs of broncho-pneumonia are often very uncertain, and by no means characteristic. Dulness on percussion often fails entirely, but sometimes with very light percussion slight loss of resonance may be detected. Vocal resonance and vocal fremitus are both absent in the child, and in the diagnosis of this disease may be dismissed from consideration. On auscultation, bronchial or tubular breathing may be heard; often, however, this is not the case. Sibilant dry sounds and crepitation—in other words, the physical signs of bronchitis—are usually well marked. Not infrequently the crepitations have a bright, sharp character, to which the term “consonating” has been applied. Often the physical signs are no more than those of bronchitis affecting the smaller and smallest tubes. The breathing is frequently very rapid, and movement of the *alæ nasi* is practically always present. The characteristic catch in the breathing, too, is worthy of notice.

Much debility always accompanies this disease; diarrhœa may be present, and very troublesome, and there is great tendency to death from exhaustion. The malady may last for weeks, with ultimate recovery, but in these prolonged cases the prognosis is generally serious.

It should never be forgotten in children that lobular pneumonia may be complicated with tuberculosis. This is of special importance, when, as is so often the case, the disease is a sequela of measles and pertussis.

Capillary bronchitis is merely another name for lobular pneumonia. It is impossible to differentiate, either by symptoms or physical signs, between inflammation of the finest bronchial ramifications and that of the infundibula and air-cells.

The appearance of lung, the seat of lobular, is in many respects different from that when the organ is affected with

lobar pneumonia. It must be borne in mind, for a due understanding of the morbid anatomy of the disease, that it is in all cases consecutive to, and associated with, bronchitis. The inflammation extends from the smaller bronchi to the infundibula and air-cells, and is present together with areas of collapsed lung.

The pneumonia occurs in patches, which can be distinctly made out on section. These patches are formed of collections of inflamed lobules, which tend to run into larger groups, and in some cases they may affect a considerable portion, or nearly the whole, of a lobe. In colour they are slaty-grey or reddish, and patches of different colour approximate one another. The solidified portion is not so brittle as in lobar pneumonia, and has more the aspect of lung compressed by fluid; in other words, of "carnified" lung.

On pressure of the solidified portion of lung fluid may exude which is frothy, or in some cases muco-purulent. The latter condition, which is not uncommon, gives the patch a yellowish tint; the solidified patch sinks in water. Collapse of the lung almost invariably accompanies the pneumonic condition. The patches of collapse are dark-coloured and airless; but they do not sink in water, and with pressure on the surrounding lung air can often be forced into them, when the aspect peculiar to collapse disappears, and is replaced by that of air containing pulmonary tissue.

Histologically, the solidification is due to filling up of the air-cells with leucocytes and epithelium proliferated from that lining the air-cell. Though the solidifying matter consists in by far the larger proportion of these elements, yet it must not be supposed that fibrin does not exist. Fibrinous effusion is by no means confined to lobar pneumonia, and careful search will invariably reveal its presence in cases of the lobular form of the disease. Inhaled products also are found abundantly in the pneumonic patches.

The chief differences in physical characters between lobular and lobar pneumonia consist in the absence of pleurisy, the smooth surface, the tougher consistence, and in the presence of patches of collapse in the former.

Treatment.

The treatment of lobular pneumonia is much the same as that of the lobar form of the disease; but it is of great importance to avoid any lowering measure in this malady. Venesection is not to be thought of under any circumstances. Free stimulation is generally requisite, and too much attention cannot be bestowed on the nursing and feeding of the patient. The latter should be repeated at frequent intervals, and in the case of young children it may be necessary to administer milk and brandy every hour, or oftener. Poultices and other heavy applications should not be imposed on the chest wall. Respiration is already greatly embarrassed, and the weight of a poultice may, under these circumstances, be a burden which cannot be borne with safety.

Care should be observed in the administration of aperients. They are not well borne in this disease, and if really necessary should be such as to cause no griping or profuse evacuation. Cold applications to the chest, in the form of cloths wrung out of cold water, have been well spoken of. We have never seen good results follow this method of treatment. As regards drugs, the fewer that are administered the better. We do not think that any of the drugs usually recommended are of the least use, and inasmuch as they all, to a certain extent, upset the digestion they may have a prejudicial influence.

GANGRENE OF THE LUNG

PULMONARY gangrene, in its medical aspect, is a secondary disease, and is almost always consecutive to pneumonia, though it may occur in septicæmia, in embolism of the pulmonary artery, and in other conditions. It is especially liable to arise in alcoholic subjects in connection with pneumonia.

The symptoms of gangrene of the lung are those of the disease upon which it depends, with the addition of more or less sudden and great debility, and of an intolerable fœtor of the breath, the expectoration acquiring the same abominable odour. Severe and profuse hæmorrhage from the mouth, due to the perforation of a pulmonary vessel, may occur, and may prove fatal. Although the disease is especially prone to affect the broken-down and feeble, yet it may occur under quite other conditions. We have seen gangrene of the lungs arise in the case of a boy whose health previously had been perfect. He contracted pneumonia, and the symptoms of pulmonary gangrene shortly afterwards developed. The case terminated favourably, recovery being complete. Symptoms.

It is well in all cases of suspected gangrene to make a careful microscopical examination of the expectoration. Fragments of lung tissue and elastic fibres may, in this way, be detected, their presence making the diagnosis certain.

It cannot be said that the physical signs in this disease are very definite; they are those of consolidation of the lungs, viz., dulness, bronchial breathing, crepitation; and in some cases, in addition, the signs of cavity and of pneumothorax are present. The diagnosis, however, must be made from the symptoms, the nature of which has been detailed above.

Fortunately, gangrene of the lung is by no means a usual complication of pneumonia or of other pulmonary affections. The prognosis in this disease is extremely unfavourable; most cases end fatally.

Morbid
Anatomy.

As gangrene of the lung is nearly always a secondary disease, and as in the large majority of cases the malady antecedent to it is pneumonia, it of course follows that the appearances characteristic of the latter affection are usually present. Under these circumstances it is generally found that the gangrenous portion of pulmonary tissue is connected with, or even surrounded by, hepatised lung. In some instances the necrotic mass is entirely separated from the surrounding lung, lying like a sequestrum within it. The gangrenous mass is usually extremely foetid, but this is not invariably so; it is dark in colour, or even black, very soft, and may be diffuent. In some cases pneumothorax is present, and not infrequently the pulmonary tissue has melted down into a fluid, or semi-fluid, or purulent material, the odour of which is most offensive. The other lung may be infected, and the seat of numerous minute abscesses.

When examined microscopically no definite structure of any kind is usually recognisable; the necrosed tissues simply form a granular mass. Hæmorrhagic extravasation into the tissue of the lung may be present, owing to the perforation of a vessel during the sloughing process.

Treatment.

All that can be done in this most dangerous malady is to support in every possible way the patient's strength. For this purpose strong soup, beef-tea, and milk may be employed; drugs are useless, but the foetor of the breath may be to a certain extent corrected by inhalation of creosote, carbolic acid, etc. Stimulants are required in all cases. Inhalation of oxygen may relieve the urgent dyspnoea which is often present when pneumothorax has developed, and which is attended with much cyanosis.

PHTHISIS

No chest disease is more rife than that which is the subject of the present article. It is met with in both sexes, at all ages, and spares no class of society.

The symptoms of phthisis are cough, wasting, and progressive debility. The onset of the disease is generally very insidious; slight hacking cough, at first dry, is often noticed at a very early stage of the malady, and it is particularly likely to be troublesome at night and in the early morning. At the same time, the patient feels somewhat tired and languid, he is less brisk than heretofore, and likes to remain quiet. At this period, if the thermometer be used, it will be found that the evening temperature is somewhat raised, it may be but slightly, perhaps to 99° or 100° . This condition of things may last some time without more obvious symptoms supervening. Symptoms.

But in some cases, with no more serious manifestations of disease than the foregoing, severe hæmoptysis may suddenly occur. This may be so alarming as to completely prostrate the patient, and it may be some days before the blood entirely ceases to be expectorated. But whether hæmoptysis does or does not occur at this early period, it is soon noticed that the patient is getting worse. The pulse is now accelerated, and is soft and compressible. The terminal phalanges of the fingers often appear unduly large and flat in the region of the finger-nail; this peculiarity is also observed in those predisposed to phthisis. Shortness of breath now becomes a marked feature, and the cough is more urgent, and is accompanied with the expectoration of muco-pus, the latter being at times streaked with blood.

The nocturnal rise of temperature becomes more pronounced, and during the night the patient suffers from troublesome sweating, which symptom may be very severe.

At this time wasting is a marked feature of the disease; flesh is rapidly lost, and the thinness and frail appearance of the patient are obvious at the first glance. The skin becomes pale and delicate, and a red flush may, towards evening, be observed on the cheeks. The *pectoralis major* and other muscles of the front of the chest and elsewhere are often unduly irritable, contracting freely when stimulated by a sharp tap. Eruptions of *echthyma* are not uncommon on the front and back of the chest.

The patient presents now the symptoms of well-marked phthisis, and in no long time he may become so seriously ill that confinement to his bed is necessary. Troublesome diarrhoea may occur, and the appetite is often very capricious or fails altogether. The expectoration increases in amount, and frequent attacks of hæmoptysis may occur. Cavities form in the lungs, the temperature becomes of a markedly hectic type, and the patient finally sinks from exhaustion induced by severe diarrhoea, or from some other complication, such as severe hæmoptysis from rupture of an aneurysmal dilatation of a vessel in the wall of a cavity, or from perforation of the pulmonary pleura consecutive to ulcerative destruction of the lung, in which case pneumothorax will be rapidly developed, and may be equally rapidly fatal.

Such is a sketch of a very usual type of the disease. But the clinical varieties of this affection are very numerous, and, in addition, arrest of the progress of the complaint is of quite usual occurrence. Unfortunately, such arrests are only too often temporary; but they do occur, and are doubtless efforts of nature which, if properly seconded and supported, may in some cases lead to complete cessation of the progress of the malady.

Some cases of phthisis run an extremely rapid course, the patients being cut off by the outbreak of acute

tuberculosis at a comparatively early stage of the disease. Others, on the contrary, tend to extreme chronicity. Instances are met with in which symptoms persist for years, the patients leading the lives of chronic valetudinarians. Between these extremes the greater number of cases are found.

The mental characteristics of most cases of this disease are peculiar. The victims of phthisis are nearly always of a hopeful cast of mind; they look forward to recovery, which in too many cases never comes, and even when a patient is so weak that he can scarcely raise himself in bed he will confidently allude to arrangements and plans which will never be carried out, and in which he, under no circumstances, could take part.

In not a few cases the earliest evidence of the onset of the disease is shortness of breath and weakness, which are found to be due to the presence of fluid in one or other pleural cavity. The fluid may undergo absorption, but the patient does not recover his health, and the symptoms just described as those of early phthisis are soon observed.

In other cases, again, laryngeal troubles herald the approach of the disease, loss of voice, hoarseness, and cough. In such the laryngeal affection often remains the chief feature of the symptomatology, and the case runs the course peculiar to laryngeal phthisis or tubercular disease of the larynx.

Digestive disturbance is not uncommon during the early stages of the disease, and may be so pronounced as to be the one symptom of which the patient complains, the slight cough and shortness of breath, practically always present, being overlooked. Loss of appetite, flatulence, abdominal pain and feelings of distension, together with constipation, diarrhoea, or an alternation of each, are the chief troubles complained of.

In women, amenorrhœa is a very important sign of early phthisis, and the possibility of this disease being the cause of the symptom should never be lost sight of; in other

words, cases of amenorrhœa, not accounted for in other ways, must be submitted to a minute and painstaking physical examination of the chest.

The physical signs of the disease at the very earliest stage are often *nil*. The most careful examination may fail to detect the presence of anything abnormal; and, even when the complaint commences with profuse hæmoptysis, it is quite usual to find no morbid signs whatever. One of the earliest evidences of the onset of the disease is deficient mobility of the chest, just below the clavicle, on one or the other side. This can be observed on inspection, and verified by palpation. On percussion, a faint loss of resonance may be perceptible, chiefly on the clavicle, and, of course, over its inner half only. Such differences of pitch between the two sides are often best elicited by percussion with one finger. In addition, percussion should be performed both in the supra and infra-clavicular region, and very especially in the supra-spinous region, the finger of the left hand being used as pleximeter. By doing this the observer often detects differences of resistance which are very important. On auscultation, it may be found that the breathing is jerky on one side; inspiration, instead of being smooth and uniform, is divided by several interruptions. To this abnormality the term "cog-wheel breathing" has been applied. It is of much diagnostic significance. Along with this, or alone, may be detected undue harshness of breath sound, with prolongation of expiration. Added sounds may or may not be present. One of the most usual is a slight click, or two or three clicks, at the end of inspiration. Such clicks are always most obvious just after the patient has coughed. It should, therefore, be a rule that no case is to be finally judged until the effects of coughing have been clearly observed. Failing this, the student is liable to fall into error.

In many cases in which the physical signs are either *nil*, or very slight, undue loudness of the heart sounds may be detected in the infra-clavicular regions. This is no doubt

due to the affected lung parenchyma forming a good conducting medium. Its significance should be borne in mind, and may be helpful in a doubtful case.

When the symptoms point to phthisis, but physical signs of the disease are absent, much assistance in diagnosis may sometimes be obtained by the examination of the sputum, if any such is present. Tubercle bacilli may in this manner be detected by very simple and rapid staining methods. The positive evidence gained in this way is most important, but the absence of bacilli in the cover-glass specimen does not by any means exclude the presence of tubercular pulmonary disease.

It is of the greatest importance to give particular attention to the examination of the supra-scapular region. In early stages of phthisis, when absent elsewhere, physical signs can be frequently detected in this locality.

So much, then, for the physical signs of the disease in its earlier stages. In more advanced cases, when consolidation has proceeded to a considerable degree, the evidences obtained by physical examination are so marked and obvious that they can scarcely be overlooked. Dulness on percussion, diminished movement, increased vocal resonance, and vocal fremitus are all present. The breath sounds are bronchial, and are accompanied by abundant crepitations, which may be of various sizes, and consonating or not. At a still later stage, when excavation has occurred, signs of cavity are easily recognised. These consist, in various combinations, of the cracked-pot note on percussion, with cavernous breathing, accompanied by a metallic crepitation, gurgling, and pectoriloquy. It is not necessary to enter into full details of these various auscultatory signs. An account of them will be found in the introduction to this division of the subject, and the student will rapidly learn their significance by a practical experience of out-patient work. It is only by the oft-repeated examination of cases in all stages of the malady that a really valuable knowledge can be gained, and the student should avail

himself of every opportunity that occurs for making such examination.

The disease sometimes begins at the apex of the lower lobe, though this is very rarely the case, the first signs of the malady being detected almost invariably at the apex of the lung. We have, however, quite recently met with a case of this description in a young man, in whom the defective resonance, the weakened breath sounds, and pleural friction gave the impression of the case being one of pleurisy with effusion, rather than of consolidation of the upper portion of the lower lobe, which was the lesion really present.

Many different varieties of phthisis have been described. In some cases the divisions are founded upon clinical features, in others upon the morbid appearances. This tendency to divide up the subject is to be deprecated. If phthisis is one and indivisible, nothing but confusion can result from the attempt to form artificial classes of the disease. We have endeavoured to show that the malady may present great differences, both clinically and pathologically, according as the tubercular destruction of the lung is more or less pronounced or active. When the tubercular deposit is of rapid formation, and quickly becomes caseous, it is obvious that the progress of the case will also be very swift, with high fever, wasting, and profuse sweats. To such cases the term acute phthisis, or "galloping consumption," has been applied. The same term has also been used to describe cases of acute general tuberculosis, in which the patient is carried off in a few weeks.

Just in proportion to the intensity of the process by which fibrous tissue is developed as the result of tubercular activity, so will the chronicity of the disease be more marked. In the most pronounced form of this reparative change, when the lung is extensively invaded by the morbid process, the result may be the so-called "fibroid" form of phthisis. In this condition the lung is penetrated

with strands of new-formed fibrous tissue, often originating in a thickened pleura. Such cases are extremely chronic in their course, and are often accompanied with marked alterations in the position of the heart, which may be greatly removed from its normal locality. It is curious, also, to note the tendency of these cases to be associated with cardiac murmurs, especially with the murmur of aortic regurgitation. We have seen a case of this description in which the heart was beating in the left axilla, and in which a loud diastolic murmur was audible. No evidence was obtainable of a rheumatic endocarditis having caused a damaged valve, and it may be that the murmur in a case such as this is due to a twisting or kinking of the aorta, leading to a mechanical incompetence.

Fibroid forms of phthisis are extremely slow in their course; they may last for ten, fifteen, or even twenty years, and in some cases the symptoms may entirely disappear, the patient being practically restored to health. The physical signs, however, persist. Severe attacks of hæmoptysis are not uncommon in the course of this form of the malady.

In most cases of phthisis the two processes of caseous destruction and of fibroid transformation go on, to a certain extent, contemporaneously. Unfortunately, the destructive tendency usually obtains the upper hand, and the patient dies. What we aim at in treatment is, if possible, to give the victory to the process of pulmonary fibrosis; and just in proportion as we succeed in securing this change, so will the recovery of the case be rendered secure. That this view of the question is founded upon satisfactory evidence is certain from the study of healed phthisis in the lungs of those dead of other and quite different lesions.

Phthisis is undoubtedly a hereditary disease, and may be transmitted from either parent, though most effectively through the mother. It may be that the hereditary tendency to the malady consists in the propagation of a weakness of constitution rendering the patient unduly liable to the attacks of the bacillus, which in persons not possessing this

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tendency are innocuous. Much remains yet to be learnt on this difficult question. The liability to the disease is greatly increased, in those predisposed, by insanitary conditions and poverty. Want of sunlight, of proper food, and of fresh air are most potent causes of phthisis. The disease, in predisposed subjects, is particularly liable to arise in women after childbirth.

It has long been thought that a tendency to phthisis is manifested in the physical condition of the patient. The future victims of this malady are often of delicate build, with refined, well-cut features, long eyelashes, soft silky hair, and a delicate, transparent skin. The terminal phalanges of the fingers are often characterised by the almond-shaped nails which may be associated with slight clubbing. In all these cases the chest is flat, the shoulders narrow, and the thoracic muscles ill-developed. It must not be forgotten, however, that the tendency to phthisis is by no means always manifested under the guise here described. In many cases the complexion is muddy, the stature stunted, the features, and especially the lips, heavy and thick, and the hair and skin coarse. Further, the disease frequently appears in those manifesting no departure whatever from that of the ordinary type of health and activity.

The pathology of phthisis has been greatly simplified by the discovery of Koch's tubercle bacillus. This was the single link required in the chain of evidence leading up to the position that phthisis is one and indivisible. For long years the most competent observers have believed more and more in the unity of phthisis, and certainly there is much force in the argument that Koch's bacillus is the fundamental cause of the disease, the widely different aspect of the lesions, from the point of view of morbid anatomy, being merely due to the histological nature of the structure in which the bacillus has lodged, and to the different stages of caseation and destruction of the inflamed tissues which have ensued. For it must be borne in mind

that the changes induced by this minute organism are distinctly inflammatory, and in their most characteristic form lead to the production of what are known as "tubercles." Microscopically, the structure of tubercle varies considerably, according to the histological formation of the tissue in which the bacillus happens to be deposited. Should the site of such deposition be the wall of an air vesicle, irritative proliferation of the epithelial cells of the same will result, and the structure of the tubercle will be of the epithelial type. Should, however, the lymphatic structures be the resting-place of the bacillus, the tubercle will be found to be made up of indifferent cells. It was formerly thought that the presence of so-called "giant cells" was a characteristic feature in the histology of tubercle. This is now known to be a mistake, and the giant cell is no longer regarded as the attribute of tubercle, occurring, as it does in many other conditions, altogether independent of the tubercle bacillus.

The resulting products of the action of the tubercle bacillus are all imperfectly vascularised. They thus tend to undergo fatty and degenerative changes, to which the term *caseous* is applied. All the changes subsequent to the deposit of tubercle in the lungs are due to the agglomeration of diseased areas, and to the softening and caseation of the same. In this way, at an early stage, masses of so-called yellow tubercle may be formed; these are, in reality, larger collections of tubercles which are undergoing caseation, and to this cause the yellow colour is due. It is obviously wholly incorrect to regard such structures as being in any sense specialised lesions; they are merely a phase in the life-history of tubercle. Much unnecessary confusion has resulted from the terminology which would differentiate grey from yellow tubercle as distinct entities.

Other micro-organisms are also found in the lesion of phthisis, especially those of suppuration, namely, the *staphylococcus pyogenes aureus et albus*. To the presence of the latter is largely due the suppurative destruction which

eventuates in the formation of the cavities so characteristic of the disease. As the process of caseation and softening progresses, the pulmonary structure becomes involved and breaks down, with the resulting formation of vomica. In this way the upper portion of the lung may be hollowed out by numerous inter-communicating cavities, while the lower lobes are simply consolidated from the presence of infinite numbers of minute tubercles which have not yet arrived at the softening stage. In other cases, as in acute tuberculosis, the whole of both lungs is stuffed with enormous numbers of miliary tubercles, all of which appear to be of the same age. In this case, the patient has been carried off by fever and prostration at a period too early for fusion and subsequent softening of tubercular areas to take place. The outbreak of acute tuberculosis is, too, uniform and simultaneous.

In favourable cases the inflammatory process, excited by the presence of tubercles, causes the development of new fibroid tissue, and to such an extent that the opposing tendency to softening and necrosis is more than counter-balanced. In this way the affected pulmonary area becomes dense and indurated by the new bands of connective tissue which are developed; and at a later stage the dried-up centres of these areas are found to contain the calcified products of caseation which are enclosed on all sides by the new fibroid material. It is not by any means unusual at post-mortem examinations to find such fibroid and calcified masses at the apex of one or both lungs, the site of the masses being indicated by pleural scarring. Years may have elapsed since these deposits were in an active stage, and they are irrefutable evidence that in some cases phthisis is capable of arresting itself, the healing process being doubtless greatly helped by suitable dietetic and hygienic treatment.

Extreme shrinking of the lung may occur in phthisis. In some cases the organ becomes completely airless, dense and firm in consistence, and on section shows a marked degree

of bronchiectasis. The heart may be drawn from its normal position, and, if the right lung is affected, may be found on that side of the body. Under such circumstances, compensatory hypertrophy, by emphysema and otherwise, occurs in the other lung, and on opening the chest the comparatively healthy lung, the only efficient one left, may be seen occupying the position normally filled by the heart, and stretching far to the right of its proper limits.

The pleuræ are often adherent in this disease, the cavity being obliterated by previous attacks of dry pleuritis. It is by such adhesion that pneumothorax is frequently prevented.

The importance of the hygienic treatment of phthisis is Treatment. paramount. Speaking generally, the patient should live, as far as possible, but with due regard to the nature of the climate, in the open air. No kind of treatment can be successful in which there is not a constant supply, day and night, of pure, fresh air. Sunshine is also of great importance, the researches of Dr. Ransome proving that the activity of the tubercle bacillus is greatly diminished, or even annulled, in the full light of the sun. Unfortunately, in this country the conditions as to weather and temperature do not admit of the air and sunlight treatment being carried out to their full extent. For this reason patients, if possible, should be sent abroad.

The choice of site must vary with the requirements of each individual case. As a rule, hæmorrhagic cases should never be sent to high altitudes, such as Davos Platz. There are innumerable health resorts in Switzerland and the Austrian Tyrol, most of which are suitable for cases of early phthisis. To these patients, too, but only to these, a long sea voyage, or a residence in certain favoured regions of South Africa, may be most beneficial.

Advanced cases of the disease should not be sent from home. The comforts of home are not to be had at foreign health stations, and it is sheer cruelty to send patients, whose condition is past hope under any circumstances, to

endure discomforts and deprivations, when at home their last days might be made as agreeable as the presence of friends and the peculiarly comfortable arrangements of the English house admit.

Under all circumstances, and in whatever part of the world the patient may be living, attention to clothing and diet is of the utmost importance. The former should at all seasons be warm, the garments worn next the skin being invariably of woollen material. The diet should be as nutritious as possible, with abundance of milk and eggs. Stimulants with meals are generally desirable.

The medicinal treatment of phthisis in recent years has been chiefly based on the antiseptic theory. It having been found, experimentally, that certain antiseptic drugs, such as creosote, are inimical to the life of the tubercle bacillus, it has been thought that if the tissues could be thoroughly saturated with these antiseptics the bacillus will be exterminated, and with it the disease. It must not be forgotten, however, that it is not an easy matter to so impregnate the tissues as to avoid poisoning the patient, and at the same time to make it uncomfortable for the bacillus; and, unfortunately, the results of this treatment are not so satisfactory as could be wished. Formerly, creosote was given in gradually increasing doses. Its nauseous taste, however, and tendency to cause eructation, have led to the substitution of its derivative, guaiacol. This drug is now administered in 3 or 4 drop doses, or in the form of guaiacol carbonate, three or four times a day. The results obtained are conflicting; after prolonged use of the remedy we are by no means satisfied that guaiacol has the least favourable effect on the course of the disease; it would be in the highest degree sanguine to anticipate that this drug will be established as a cure for phthisis.

Cod-liver oil is a valuable addition to the list of remedies for phthisis; it must be regarded rather as a food than as a medicine. Malt extract is often of use, and can be combined with cod-liver oil.

Particular symptoms will require to be treated; of these, cough is one of the most troublesome. It is not well to resort to the use of opiates, except in very minute doses. Opium has a tendency to dry up and retard secretion, whereas it is desirable that cavities and bronchial tubes should be cleared of their muco-purulent contents as far as possible. A very good way of alleviating cough is by the dry inhalation of a few drops of a mixture containing creosote and carbolic acid in rectified spirit. Night sweating is often a symptom very distressing to the patient. For its relief numerous drugs have been recommended. Of these, oxide of zinc is sometimes useful; but belladonna or hypodermic injection of atropine are the most reliable remedies. The symptom can often be controlled by the administration of food during the night, and by tepid sponging. Diarrhœa is often a very troublesome feature of this disease. When it depends upon tubercular ulceration it may be most difficult to arrest. In such cases all that can be done is to try one remedy after another, in the hope of finding one to which the symptom is amenable. If the temperature tends to become unduly high at night, it may sometimes be controlled by the administration of 5 grains of antipyrin or phenacetin; but the use of this class of drug should be very sparing in this disease on account of the debilitated state of the patient and the consequent weakness of cardiac action. Quinine, iron, and arsenic are often useful for the treatment of the anæmia and debility which are such prominent features in the symptomatology of phthisis.

It is only fair to add that the treatment so successfully inaugurated at Nordrach, in the Schwarzwald, is now being imitated in numerous specially constructed establishments in this country. It is yet too early to speak positively as to the results obtained, but we have seen sufficient of this mode of treatment to enable us to speak with a considerable degree of confidence on its favourable effects, and we think that many cases which it has been the custom hitherto to

send abroad might now be treated at home in one or other of the institutions which are arising for the open-air treatment of phthisis in many parts of our own country.

CIRRHOSIS OF LUNG

THESE, as in other varieties of phthisis, are cough, Symptoms. expectoration, hæmoptysis, and wasting; but the development of the evidences of disease is very gradual. A characteristic symptom is recurrent hæmorrhage; it may be very severe, and the intervals between the attacks are often prolonged. Gradually increasing breathlessness on exertion is a constant symptom.

Cases of this malady are often very protracted, extending over many years. In some the symptoms develop after an attack of pleurisy or pneumonia, from which the patient has never satisfactorily recovered. Often, however, the disease creeps on with insidious steps, and the commencement is quite unmarked by any serious symptoms.

Cirrhosis of the lung is a particular form of phthisis, distinguished by the very strong tendency displayed to the development of fibrous tissue. Whether in all cases the origin of this fibrosis is the same is at present an open question. Reference has already been made to the tendency of miliary tubercle to undergo fibroid change, and to the importance of this change from the point of view of the possibility of recovery. It is probable, therefore, that in some of the cases of cirrhotic lung the condition may be due to fibroid changes which have occurred in a previous deposit of miliary tubercle.

But in the majority of cases fibrosis of the lung does not originate in this way. In those who follow dusty occupations, or whose employment necessitates the inhalation of metallic particles, the constant irritation of the lung

substance may lead to a chronic inflammatory process which affects the tissue between the lobes, between the alveoli, and that around the vessels and bronchi. In this way a cirrhosis may be set up. There are other cases in which no irritation of any kind can be traced; without apparent cause, and apart from previous pleurisy, the lung becomes dense, hard, and more or less airless from the growth of thick strands of new-formed fibrous tissue which penetrate the organ in every direction. Such cases strongly suggest the same process being at work as that which is efficient in interstitial nephritis; in fact, pathologically speaking, the two processes are identical.

The physical signs are deficient movement of the affected side of the chest, retraction of the chest wall, and displacement of the heart, which may be observed by the eye to be out of its normal position. On percussion dulness is well marked, and on auscultation signs of consolidation and of cavity are usually detected in those cases which are of any duration. Frequently, however, the signs of cavity are not due to its presence, but to that of dilated bronchus, which is a frequent factor in the complete evolution of the disease.

The abnormal position of the heart is a very constant and very important physical sign. It is drawn by the contraction of the lung, owing to the presence of the abnormal fibroid tissue, into various unusual positions. We have seen the heart beating in the lateral region between the anterior and posterior axillary lines, where its dulness was easily detected. The normal area was resonant on percussion. Various murmurs are of usual occurrence in these cases. A regurgitant aortic murmur is not uncommonly present, which is certainly not connected with diseased valves.

The duration of this form of phthisis is prolonged; many cases tend to amendment, but symptoms of chronic bronchitis persist. We have known the disease to continue, with gradual improvement, for twelve years.

The measures which are applicable to the treatment of Treatment. ordinary phthisis are those which must be adopted in this chronic lung disease. Favourable hygienic surroundings, abundance of fresh air, and good food are all of the first importance. Cod-liver oil is often of great value.

Attacks of hæmorrhage, to which there is considerable liability in this disease, must be treated on lines already indicated when discussing the treatment of hæmoptysis.

MALIGNANT DISEASE OF THE LUNG AND OF THE MEDIASTINUM

THIS malady generally originates in the mediastinal glands, the lung, however, being speedily involved.

The physical signs and symptoms of malignant disease of the lung are those due to the presence of a tumour, and to the pressure which it exerts on the contents of the chest, and on the vessels and nerves connected therewith. Thus a tumour in the chest will cause dulness on percussion, absence, or relative weakness of breath sounds, and if the exploring needle be inserted into the dull area, fluid will probably be withdrawn from the pleural cavity. This fluid is very frequently blood-stained.

A prominent physical sign in this disease is the presence of dilated cutaneous veins in the neighbourhood of the growth. In cases in which the new growth presses on the large veins or on the *venæ cavæ*, this enlargement may be one of the most marked features of the case. We have seen the whole front of the chest and abdomen the seat of a network of dilated superficial veins in the case of malignant tumour pressing upon the ascending cava. Speaking generally, it may be said that aneurysms have a tendency to press upon arteries, new growths on veins when affecting the thorax. Hence if, in a given case, venous engorgement is a prominent feature, it is more probable that the disease is a new growth than an aneurysm.

Enlargement of glands in the neck or axilla may be present and, if so, is of great significance.

Symptoms.

The symptoms of pulmonary new growth are pain, cough,

expectoration, which may be blood-stained, foetid, and occasionally such as to indicate pulmonary gangrene, breathlessness, and rapid loss of flesh and strength. Fever is not seldom present, and may be of hectic type. Pain is a prominent symptom, in some cases extending down the arm in a manner similar to that experienced in cases of aneurysm, when the brachial plexus or its components are pressed on. Pressure on the œsophagus may cause marked dysphagia, and if the recurrent laryngeal nerve be affected, loss of voice or hoarseness may result, together with the laryngoscopic appearances characteristic of this accident.

Severe dyspnoea may be a marked feature of the case, and if pressure occurs on the trachea or large bronchi it may be a most distressing symptom. Gangrene of the lung is occasionally caused by the pressure of a new growth. Death is not seldom due to pneumonia.

Secondary growths may, of course, occur. In some cases the symptoms due to the latter are more pronounced than those caused by the primary disease. We recall a case in which the symptoms were cerebral, indicating a new growth of the brain. At the post-mortem examination a sarcomatous tumour of the brain was certainly found, but it was secondary to mediastinal new growth affecting the left lung, which was simply infiltrated with the malignant disease; yet no symptoms had caused attention to be directed to the chest. Acute pleuritis is often present in pulmonary new growths, and, as already mentioned, effusion into the pleural cavity, often blood-stained, is a very usual occurrence.

In no case is death delayed in this disease beyond a few months. If the patient escapes death by pneumonia or pulmonary gangrene, he usually sinks from asthenia, or from the results of secondary deposits in other organs, such as the liver.

Mediastinal growths are generally lymphomata or lympho-sarcomata, and they originate usually in the mediastinal glands. True carcinoma also occurs, but more rarely. The

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lymphomatous tumours show under the microscope a structure consisting of small round or fusiform cells. If they do not originate in the bronchial glands there is some reason to believe that they may take origin in the thymus.

The lung is generally found to be infiltrated with the growth, which is especially abundant at the pulmonary root. It is usually a somewhat yellowish mass, with a marked tendency to soften and break down, involving the pulmonary tissue in the destructive process. In this way large cavities may be formed. Both lungs are usually affected, but one often much more so than the other. Secondary growths may be met with in the brain, liver, kidneys, or other organs.

Treatment.

There is no treatment for this disease, which is invariably fatal. All that can be done is to prolong life by measures adapted to relieve symptoms and to support the strength of the patient.

SYPHILITIC DISEASE OF THE LUNG

THE symptoms of pulmonary syphilis are those of chronic chest lesion, and in themselves present no characteristic feature. They are those of chronic bronchitis or of phthisis, and it is only the history of the case, and the presence of other signs of syphilis, that enable the observer to make a correct diagnosis. The same remarks apply equally to the physical signs, which are in no sense characteristic of syphilis. When softening and breaking down of gummata ensue, signs of cavity will naturally present themselves. Should the disease be of the infiltrating type, the clinical aspect of the case will be that of chronic induration. Occasionally severe hæmorrhage may ensue from sloughing and ulceration of the bronchial mucous membrane. Symptoms.

Syphilis of the lung is but rarely observed, and occurs in the later tertiary stages of the disease.

Syphilitic disease of the lung may present itself under more than one form, from the point of view of morbid anatomy. Perhaps the most usual manifestation of the disease is the presence of scattered gummata. These present, however, peculiarities of structure; by the breaking down of the lesions, large cavities may result. Morbid
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Another form of syphilitic pulmonary disease is that of diffuse fibrous infiltration, rendering the lung dense and hard. The infiltration is specially marked around the bronchial tubes, alveoli and vessels; by its contraction the changes found in chronic interstitial phthisis may be induced; indeed, the appearances of this form of pulmonary syphilitic disease are practically indistinguishable from

those found in the so-called "fibroid" phthisis. As is often the case in the latter disease, the new growth appears to originate beneath the pleura, whence it grows, as it were, into the lung.

A congenital form of syphilitic lung disease has been described by Virchow as *white hepatisation* (*pneumonia alba*). It occurs in syphilitic infants, and owes its name to the pale, shining appearance of the cut surface of the diseased lung. It presents histologically the usual structure found in such lesions, viz., a new growth of fibroid tissue, differing in no important respect from the other interstitial manifestations of the tertiary form of syphilis.

Treatment.

Those who are the victims of visceral syphilis are in a more or less broken-down, debilitated condition of general health; hence every effort should be made to combat this condition by the administration of nourishing food, cod-liver oil, malt extract, and quinine and iron. The special treatment of the malady, of course, consists in the administration of large doses of iodide of soda or potash together with some form of mercury, such as the liquor hyd. perchlor.

HYDATID OF THE LUNG

As is the case with hydatid disease in general, that of the lung is rarely seen in this country.

When affecting the lung, the hydatid tumour may occupy any part of the organ, but is relatively more common at the right base; the reason for this is undoubtedly the co-existence of hydatid disease of the liver.

There is nothing distinctive as regards the physical signs and symptoms of this affection.

Prominence of the intercostal spaces, immobility during respiration, dulness on percussion, and absence or weakness of breath sounds may all be present over a hydatid tumour; but there is nothing in these physical signs to differentiate hydatid disease from ordinary pleural effusion, simple or purulent, or from new growths involving the pleura and lung.

But the hydatid cyst may perforate a bronchus, and the expectorated matter may contain the characteristic hooklets, or by an exploratory puncture evidence as to the real nature of the case may be obtained.

Hydatid tumour of the lung may perforate the latter, or it may evacuate itself through the wall of the chest—by far the most favourable development. On the other hand, the contents of the cyst may pass into the pleural cavity, in which case an empyema will probably be the result. Should the lung be perforated, speedy suffocation may ensue from blocking of the bronchial tubes with the contents of the cyst. In some cases the contents of the hydatid tumour dry up and cease to be a source of

harm; such dried-up remains of previous pulmonary disease due to hydatids are occasionally found at post-mortem examinations.

It is often very difficult to distinguish hydatid disease of the lower lobe of the right lung from similar affection of the liver; and, as already mentioned, it is by no means unusual for both organs to be simultaneously affected. It must not be forgotten that the lung may be involved consecutively to hydatid disease of the liver. When this happens, the diaphragm is perforated, and the contents of the cyst may either burst directly into the lung or they may first gain the pleural cavity, and thence pass into the lung.

Unless the hydatid tumour of the lung suppurates, in which case high fever and rigors may occur, this disease is not usually attended with marked general symptoms, apart, of course, from those which are due to the accident already alluded to, *e.g.*, perforation of the pleural cavity. Nevertheless, hydatid disease, when affecting the pulmonary organs, is a very serious one, life being threatened in so many and various ways.

The morbid anatomy of this malady presents no special features. The structure of the cyst is altogether the same whether the disease be situated in the lung, liver, or other organs.

The treatment of the disease is far from satisfactory. When the diagnosis is certain, and at the same time the tumour is accessible to surgical measures, these should be adopted with the view of removing the disease. Such a proceeding is possible in but few cases.

CONGESTION OF THE LUNGS

CONGESTION of the lungs is a term frequently used, yet it is one which it would be better to dispense with. It is indeed difficult to define exactly what is meant by this expression, but certainly the term is very often used as a euphemism for pneumonia. This is when the expression, "congestion of the lungs," is used by medical men; by the laity, "congestion of the lungs" implies a substantive condition quite distinct from pneumonia. The term is used in the sense of œdema of the lung, which is a purely passive process.

If the expression is retained, it would be better to limit it to the early stages of pneumonia, before consolidation has taken place, and possibly to a certain form of stasis occurring in old people, in whom active engorgement of the lung sometimes supervenes in the course of a few hours, showing itself by dulness, more or less bronchial breathing and crepitation, and yet being unaccompanied with fever.

From what has just been said, it will be obvious that it is not possible to enter further into the diagnosis and treatment of a condition which we believe to have no separate and independent existence, and which is in reality merely a phase in the clinical history of other lung affections.

ŒDEMA OF THE LUNGS

THIS condition may be said to be invariably present at post-mortem examinations. It is due to failing action of the heart, by which the blood stagnates more and more in the different organs, and particularly in the lungs, through special failure of the right ventricle.

But although never absent in the dead body, the intensity of the œdema may vary considerably. This greater or lesser degree of œdema depends, of course, upon the cause of death, and it is naturally most marked in dilated heart, and in inflammatory conditions of the lungs, such as pneumonia. In the febrile state, however caused, œdema of the lung is often more or less in evidence, and it is generally very well marked in fatal cases of chronic nephritis.

Symptoms.

The symptoms of œdema of the lungs are gradually increasing shortness of breathing, with perhaps orthopnoea, a cyanotic tint of the face, especially of the lips; cough, with abundant watery expectoration, may also be present. Great bodily weakness accompanies these symptoms, and rapidly increases; the pulse is feeble, and its rate accelerated.

The physical signs consist in more or less defective resonance on percussion over the lung bases, where œdema is always most marked, together with harsh or bronchial breathing, and crepitation of various sizes. The temperature is usually normal.

It will thus be seen that the symptoms and physical signs are really those of heart failure and of lung engorgement.

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Œdema of lung is caused by the exudation of serous fluid from the blood into the bronchi, infundibula, and air-

cells. It is absolutely an apyrexial, more or less mechanical, process, depending upon engorgement of the pulmonary vessels from circulatory weakness.

The œdematous lung has a more or less water-logged appearance, is crepitant, and on pressure large quantities of frothy fluid escape, so that the lung resembles, in severe cases, a sponge from which water is squeezed. The whole of the organ is affected, but the water-logging is especially marked at the base and apex.

The condition upon the presence of which the œdema depends must, of course, be treated. The onset of œdema may be sometimes delayed by changing the position of the patient from time to time, to overcome, as far as possible, the effects of gravitation. This procedure is of importance in the treatment of fever cases, when œdema of the lung may be a most serious complication of the malady. Stimulants will be required, and in some cases the hypodermic injection of strychnine. Venesection may be useful, and sometimes dry cupping over the lung bases is followed by satisfactory results. Purgatives, with hydrogogue aperients, will often be requisite. Treatment.

ASTHMA

ASTHMA is a disease in which sudden and very severe attacks of dyspnœa occur, accompanied with greatly increased expiratory effort, and in which emphysematous changes are generally more or less marked in the lungs.

No disease is more capricious in its developments than is asthma. Some patients are only free from attacks when in the pure air of the country, remote from cities ; while in others the manifestations of the malady are never absent when they are apparently under the most favourable influences as regards their surroundings, but the same people may be perfectly well when living in the smoke-laden atmosphere of some great city. Experience will alone decide what localities suit an asthmatic patient.

Symptoms.

In some cases the attack of asthma is heralded by premonitory symptoms ; in others it comes on quite suddenly and unexpectedly, often during the night. When premonitory symptoms occur, they often consist in a certain wheeziness and slight dyspnœa, or in irritability of temper and restlessness. The actual attack commences with urgent dyspnœa, necessitating the upright posture in bed. Sometimes the patient will seek relief at the open window, grasping any convenient firmly-placed object in order to fix the muscles of the chest, and this, it may be, in the depth of winter. The respiration is slow, and expiration is very markedly prolonged ; herein the difficulty of breathing differs greatly from cardiac dyspnœa, as well as by the fact that the extreme restlessness of the cardiac patient is completely absent. Far from being restless, the victim of asthma sits quite still, with his attention

concentrated on the performance of the respiratory act. The breath sounds are weak, and are often accompanied by rhonchus and sibilus, which may be apparent to the bystanders in the form of wheezing. The distress of the patient is so great that his pupils dilate, free perspiration ensues, and the pulse is often remarkably small. All the accessory muscles of respiration are thrown into action, and the breathing is obviously laboured. After a time, varying from some minutes to a few hours, the spasm passes off, and the expiratory effort, which is always such a prominent feature of the attack, gets less marked. The breathing becomes freer, and the patient coughs and expectorates small round pellets, and later muco-purulent matter. The small masses at first expectorated are found to be of peculiar structure. They are the so-called "Curschmann's spirals," are apparently formed of mucus, and appear to be casts of the small bronchial tubes. Gradually the respiration becomes easier, and the patient falls asleep, from which he often wakes in his usual health.

It will be gathered from the foregoing description that in asthma the difficulty consists in the air of the lungs not being changed with sufficient rapidity, whereas in dilated heart the dyspnœa is of a different character, being due to the mechanical obstacle to the normal supply of blood to the lungs. In the latter there is but little difficulty as regards the aeration of the lungs, but the stasis therein prevents an adequate amount of blood deriving benefit from the supply of oxygen contained in the air.

It is impossible to predict when or how often the asthmatical attack may occur, but there is no doubt that the recurrence of the attacks is influenced, not only by locality, but also by the state of the general health. As regards the latter, in many cases the presence of constipation or of indigestion will bring about an attack; and in some cases this is invariably produced if a certain kind of food is partaken of. It can be easily understood that the frequent repetition of attacks of asthma, with the violent

expiratory efforts attending them, must induce morbid changes in the lung tissue. As a matter of fact, this is always the case, and the appearance of the asthmatic is characteristic. He is emaciated, with barrel-shaped thorax, high shoulders, and there is marked development of the accessory muscles of respiration. In fact, his chest presents those appearances which are characteristic of well-marked emphysema. He is seldom entirely free from bronchial catarrh, and obvious wheezing frequently accompanies the movements of respiration. Asthmatics rarely die from the direct attack; but the constantly increasing emphysema throws a strain upon the right heart which, sooner or later, gives rise to signs of failing compensation. It is to this complication that the victims of asthma usually succumb.

The student must be particularly careful not to diagnose asthma unless the symptoms, physical signs, and history of the case make the presence of the disease unequivocal. Real asthma is not a common disease; no disease is more common than emphysema and chronic bronchitis, and when, in the latter, attacks of difficulty of breathing occur, they are tolerably certain to be described by the patient as being due to asthma. In such cases bronchitis is the real disease; the emphysema and attacks of dyspnoea cause an increased expiratory effort, and this, again, gives rise to emphysema, the bronchitis which is so often present complicating the latter.

In some cases the irritation of the pollen of certain plants will cause paroxysms of dyspnoea indistinguishable from those of asthma.

Causation
and Morbid
Anatomy.

The causation of spasmodic asthma is unknown. The phenomena have been explained by the assumption of a sudden acute inflammatory swelling of the mucous membrane lining the small bronchi. Another explanation regards the disease as of nervous origin, and as depending upon derangement of function in the respiratory centre and of the nerves in connection therewith. According to

this theory, a sudden violent spasm of the small bronchi occurs which is due to nervous influence. To this contraction of the smaller bronchi the symptoms are due, and they all yield upon the sudden cessation of the spasm. A considerable amount of support is rendered to this theory by experiments with the nitrites. These drugs appear to have great influence in relieving the spasmodic contraction of non-striated muscular fibre, and they have been found of signal service in the treatment of the asthmatic paroxysm, probably through this relaxing influence.

The expectoration in this disease is found to contain large numbers of leucocytes staining readily with eosin. The significance of this fact, if any, is unknown. But the same condition has been found in the blood, except in the intervals between the attacks. The expectoration in its early stages, as already mentioned, contains certain peculiar bodies known as Curschmann's spirals, which are in reality casts of the small bronchial tubes, and it has been thought that these bodies may have some causal relation to the disease. Very often, too, certain octohedral crystals, known as Leyden's crystals, are also present at the same time as the spirals. It has been suggested that these crystals, by causing irritation of the lining of the bronchial tubes, might set up the asthmatic paroxysm. This view, like so many others, has now been exploded.

Reference has already been made to the fact that the pollen of various grasses and plants may cause attacks resembling those of asthma, and that the same occur in connection with chronic bronchitis and emphysema. Similar attacks have also been observed in the case of those suffering from adenoids or nasal polypi. All these attacks are merely examples of dyspnoea of asthmatic character. The name "Asthma" should be used strictly, and applied only to the spasmodic disease of which the real cause is unknown.

True spasmodic asthma presents no characteristic features after death. No gross or microscopic changes are known,

and those which are found are due to complications only. It has already been clearly shown that asthma leads to emphysema and bronchitis, and that these are the lesions found in old-standing cases. They are, however, effects, not causes, and should be so regarded. Much confusion would be avoided if this were more generally recognised.

Spasmodic asthma may be met with at any age, but is more common in early life; it is certainly more often met with in males than in females, and there is a considerable body of evidence in favour of its hereditary transmission. In hospital practice true asthma is by no means of common occurrence. Generally "asthma" in the out-patient room is nothing more than the paroxysmal attacks so often met with in cases of chronic bronchitis and emphysema.

Treatment.

This consists in the management of the paroxysms and of the inter-paroxysmal periods. Great numbers of drugs have been employed, and lauded, for the treatment of the asthmatic attack. Nothing is so generally efficacious as the hypodermic injection of morphia, but its use requires the greatest care and judgment, as there is considerable risk of a morphia habit being established. It should never on any account be left to the patient for self-administration. Chloral hydrate is sometimes of use, and occasionally cases do well when treated with ethereal tincture of lobelia. The latter remedy is a depressing one, and should be used with caution. Inhalation of nitrite of amyl is occasionally very effectual, but frequently it fails entirely. Inhalation of chloroform is generally successful, but not altogether devoid of risk. If chloroform is administered, it is not necessary to proceed to the full limits of its action. Relief is generally obtained in favourable cases long before the patient becomes insensible. Much relief sometimes follows the inhalation of vapours given off by burning stramonium, or by igniting blotting-paper previously soaked in saturated solution of nitrate of potash, and dried. An old-fashioned, but useful, remedy is strong black coffee.

In all cases it is necessary to secure a free action of the bowels. This precaution should never be forgotten. Iodide of potassium is a useful drug in the treatment both of the paroxysmal and of the inter-paroxysmal period. As regards the directions which should be given for the management of the latter period, it is of the first importance that the patient should live in a climate which experience may have proved to be a suitable one for his particular case. It is quite impossible in this malady to foretell what climate may agree, as will be readily gathered from what has been previously said. No general rules can be laid down on this matter, for no two cases of asthma agree in the nature of the climate which suits them best.

Dietetic treatment is of great importance. The food should be light, easily digestible, and nourishing. Meals late in the evening should be avoided. The skin must be kept active, and the patient should be always clad in flannel. The bowels must be regulated and efficiently relieved. As regards medicine, nothing is better for most cases than iodide of potassium. Sometimes arsenic is useful, and may be combined with the iodide. Quinine, iron, strychnine, and cod-liver oil are all useful.

PLEURITIS

INFLAMMATION of the pleura may be dry and fibrinous, that is to say, may be accompanied with the deposit of fibrinous threads on the pleural surface, and a very small fluid effusion only; or it may be attended with a marked outpouring of fluid, the deposit of fibrin being merely a secondary factor in the pathology of the condition. In the latter case the effusion may be either clear or purulent.

Symptoms.

The symptoms of dry pleurisy (*pleuritis sicca*) are generally local only, and consist of pain in the affected region, generally the side and front of the thorax. This pain, known by French writers as the "point de côté," is very often slight, but may be severe and stabbing; it is increased by taking a deep breath, or by coughing. As a rule the temperature is not elevated, or, if so, to a very slight degree.

The physical signs in cases of dry pleurisy will seldom reveal much that is characteristic until auscultation is resorted to. Still, in some cases a friction rub can be felt on palpation, and on inspection the breathing may be obviously shallow and rapid. On auscultation, these qualities will also be recognised; and, in addition, a pleural friction sound may be audible. This is a to-and-fro superficial sound, intensified by pressure of the stethoscope to some extent, and most loudly heard in the lateral region and in that of the upper front chest. The patient is often sleepless on account of the pain, and there may be slight febrile symptoms.

In most cases, after a day or two, the pain passes off, the temperature, if previously raised, becomes normal, and no

further trouble arises ; but in others, although the pain no longer torments the patient, yet he complains of gradually increasing shortness of breath and of inability to lie comfortably on the side originally affected by the pain. This state of things may go on for a week, a fortnight, or longer ; but the symptoms do not amend. Finally, medical advice is sought, and examination then reveals the following physical signs : On inspection, it is noticed that the affected side moves less freely than its fellow, and in some cases it may be observed that the intercostal spaces bulge unduly. The heart, also, may be noticed to be beating outside its normal limits. On palpation, the impaired movement observed by the eye is felt also by the hand, when compared with that of the opposite side. When the patient speaks, it is found that the vocal fremitus is markedly diminished on the affected as compared with the sound side. On percussion, dulness of a very distinct and characteristic quality is easily made out. Auscultation in an adult will reveal marked diminution, or even suppression, of the breath sounds on the affected side, and these sounds on the healthy side are exaggerated. It is understood that the examination is carried out over the base of the lung below the scapula. On auscultation of the upper lobe, beneath the clavicles, it is not unusual to find that the breathing on the affected side is markedly bronchial, leading to a suspicion of the presence of consolidation, and the percussion note in this locality may also be markedly different in quality to that elicited in the corresponding region on the healthy side. It may be high-pitched, or hyper-resonant. All these signs, when taken together, point to the presence of fluid in the affected pleural cavity. The accumulated fluid, by the force of gravity, descends to the lowest point of the cavity, and, compressing the lung, at the same time forces it into the groove between the ribs and spinal column, and also upwards. It is obvious that the fluid will act as a damper, deadening both the respiratory sounds and those originating

in the larynx. The presence of the fluid will also tend to displace the heart, and the position of the latter organ may show marked changes when the quantity of fluid is considerable. In right-sided pleurisy, with effusion, the liver is often found to be considerably depressed, especially in children. Another sign, though one of quite secondary importance, in fluid effusion is that phenomenon to which the name of *ægophony* is given. This consists in a peculiarity observed in the quality of the voice when a stethoscope is placed over the pleural effusion, and auscultation practised while the patient speaks. The voice is heard with a peculiar nasal, squeaking intonation, not easily described, but perfectly recognisable when once experienced, and which has been compared to the bleating of a goat. This phenomenon is often absent, and is really superfluous, the physical signs being so striking without it that a mistake of diagnosis can scarcely be made. With regard to children, the detection of pleural effusion is far less easy and certain.

There are several peculiarities attending the physical signs of pleural effusion in childhood with which it is most necessary to be well acquainted. In the first place, the dulness is often far less marked in children than in adults, and very often the difference of note on the two sides consists merely in high-pitched percussive resonance over the affected area. And to elicit this it is necessary to percuss very lightly, often with one finger only. In the second place, the deficiency of breath sounds, so marked a feature in the case of adults, is often entirely wanting in the pleural effusions of children. Instead of deficiency there may be harsh or even bronchial breathing, leading to the diagnosis rather of lung consolidation than of the presence of fluid in the pleural cavity. Lastly, the evidence obtained by vocal fremitus and resonance is of no value in young children. As regards fremitus, it is often absent in perfect health, and the same may be said of vocal resonance. On the other hand, the heart is markedly

displaced in the effusion of childhood, and its position should always be carefully sought before making the diagnosis.

Several things may happen to fluid when accumulated in the pleural cavity. Should the quantity not be excessive it may be absorbed, in which case the dyspnœa diminishes, the signs of effusion disappear, and give place to those that are normal, the patient recovering. The process of absorption is attended with increasing distinctness of the breath sounds, together with the return of pleural friction, the so-called "redux" friction, which is often very distinct, and resembles the creaking of leather, the crumpling of paper, or is of a stretching, drawing character. Even in these favourable cases, however, a certain amount of dulness or high-pitched resonance persists over the affected side, it may be for months after convalescence is established, and at the same time the breath sounds may be diminished as compared with the healthy side. The quantity of fluid may increase, in which case all the symptoms are aggravated, and orthopnœa and cyanosis may supervene. At the same time, naturally, the physical signs become more extensive in area and more marked in degree. Lastly, the fluid, previously clear, may become purulent. This is a serious change, and one that takes place with surprising rapidity in children. In a few hours the clear contents of the pleural cavity in a child may become markedly purulent, and the case is then one of empyema.

It is generally quite impossible to distinguish by physical signs between a clear effusion and one which is purulent. The physical signs differ in no respect, and unless evidences peculiar to abscess formation are present it is totally impossible, without exploration, to give a decided opinion as to the nature of the effused fluid. The temperature is no guide. In clear effusion it is not uncommon for the temperature to be raised a degree or two, and for slight perspiration to be present, whereas, in purulent effusions, it is quite usual to observe a perfectly

normal temperature. In some cases the bulging of a particular portion of the thoracic wall, together with the presence of dilated veins, may point to the fact of pus seeking the surface. In this way the empyema may point and discharge itself. The point of discharge may be at any part of the chest wall, but is often in the lateral region. Occasionally the pointing empyema pulsates from the transmission to it of the cardiac movements. An empyema may burst into the lung, and the pus, thus gaining access to the bronchi, may be evacuated through them and by the mouth. In some cases death may occur suddenly from flooding of the bronchi in this way. The purulent effusion may, again, in rare cases, burrow through the diaphragm, and, passing backwards, gain the retro-peritoneal tissue, finally presenting in the groin, a striking resemblance to psoas abscess thus arising. Or, once more, it may perforate the pericardium, causing purulent pericarditis. On the other hand, an empyema, if small and encysted, may dry up, and the patient may soon regain health and strength. Or, again, the discharge may persist through the production of a so-called pyogenic membrane and the formation of an abscess, and the victim may pass into a hectic condition with wasting, dying ultimately of lardaceous disease. Retraction of the chest wall may ensue after pleurisy with effusion, especially in those cases in which the fluid, not having been removed sufficiently early, the corresponding lung has become firmly bound down, and incapable of being again expanded. This condition is frequently seen also in cases of chronic empyema.

From this sketch of the subject it will be gathered that pleurisy may be a trivial malady, or may present all degrees of severity up to and including great danger to life. In the case of pleuritis sicca, as already mentioned, recovery generally ensues in the course of a few days, but even in this form of the malady adhesions may occur between the visceral and parietal layers of pleural

membrane, whereby its cavity is partially obliterated. It is quite usual to find such adhesions at post-mortem examinations when nothing in the previous history of the patient pointed to chest affection of any kind. Cases of pleurisy with effusion are, of course, more serious than those of pleuritis sicca, but even here recovery is the rule. In these cases there is often some elevation of temperature, to 102° or even higher; there may be sweating at night, and the patient lies on the affected side in order to allow the healthy side free play, and to take, as far as possible, the pressure of the fluid off the compressed lung. In many of these cases the fluid is absorbed, and in a larger number its removal by aspiration is attended with satisfactory results. But it must never be forgotten that in such cases there may be something behind the pleurisy which is really the cause of the whole mischief. Certain conditions are liable to be attended with pleurisy as a complication. No case of croupous pneumonia is unaccompanied with pleurisy, and in some the effusion of fluid may be so great as to require operative interference; in most of such cases, however, the effusion is slight and of no importance. When pneumonia does not resolve at the proper time, and dulness persists, empyema should always be suspected, especially in the case of children. In renal disease pleurisy is occasionally met with, and it must never be forgotten that pleural effusion may be the very earliest sign of pulmonary phthisis. It may occur also in malignant disease of the pleura.

These remarks are made in order to urge upon the student the necessity of carrying out, in every case, a most thorough examination of all the systems of the body before forming a diagnosis as to the cause of a pleural effusion.

Whenever the fluid becomes purulent the aspect of the case is serious. The marked tendency of children to this form of pleural effusion has already been referred to. In adults it is less common, but may occur in alcoholic subjects or in those whose health is broken down in other ways.

When a large pleural effusion is left untreated, sudden death may occur from syncope. It is needless to say that cases of this description are very rare, and that they occur only in those who have not sought medical advice. Nevertheless, it is important for the student to remember that it is never safe to postpone the operation of paracentesis when the amount of fluid is large, and the symptoms of dyspnoea are becoming urgent.

Causation
and Morbid
Anatomy.

Pleurisy is due to a considerable variety of causes, some of which have already been referred to under the head of symptoms and physical signs. It may be caused by a blow on the chest or other injury, or, as a complication, may be met with in renal disease, pneumonia, and phthisis. It occasionally occurs in connection with acute rheumatism, in which case it is the most prominent feature of the symptomatology, the articular manifestations occupying an entirely subordinate position. Pleurisy may be due to malignant or tubercular disease of the serous membrane. It is a moot point whether the affection may be excited by exposure to cold. By many such exposure would be considered to be by far the most usual cause, but when the facts are carefully sifted it will not seldom be found that the exposure was merely the exciting cause, some other agency, such as tubercle or renal disease, hitherto latent, being the real and efficient factor.

Pleural effusion, pure and simple, must be carefully distinguished from pleurisy. The former is a passive accumulation, due generally to failing heart power, whereas in pleuritis an active inflammatory process is the essential feature.

Pleurisy may also ensue as the consequence of extension of inflammation from neighbouring parts, such as the pericardium, the lung, or the chest wall.

Pleurisy is an inflammatory condition of the serous membrane lining the wall of the thorax, and covering the lung. All the usual phenomena of inflammation are observed, such as increased cell production, both epithelial

cells and leucocytes sharing in this increase, effusion of fibrin on the pleural surface in streaks and threads, and also of a serous fluid, rich in fibrin, which frequently coagulates, and appears as masses floating in the fluid effused. The affected pleura is reddened and dull, its natural polish being lost. The surface may be merely granular, from the deposit of fibrin, or it may be thickly coated with the latter, so that so-called "false membranes" are formed, which may be half an inch thick, of light yellow colour, and firmly adherent to the pleural surface. The fluid effused is usually of lemon colour, nearly clear, often containing flocculi of lymph, and is found to be highly albuminous on boiling. On standing it may coagulate spontaneously. It differs little from ordinary blood serum. When fluid is abundant, the corresponding lung may be seriously compressed and practically airless. In this condition the lung is much reduced in size, and is firm and dense in consistence. It may be œdematous, and the pleura covering it is often the seat of the firm false membrane already described. Should the fluid be blood-stained, there is strong reason to suspect the presence of malignant disease of the pleura. The false membrane on the pleural surface may undergo a process of organisation, whereby new connective tissue is formed. This process leads to thickening of the pleura, which may persist for the rest of life. With this thickening, or independently of it, adhesions of the parietal and visceral pleura may ensue, by which the pleural cavity is partially or totally obliterated.

When suppuration occurs the fluid differs in no particular from ordinary pus. In most cases it is sero-purulent, not being purulent throughout, but chiefly so in the lower levels of the effused fluid. The usual micro-organisms are found in the effusion, especially the *staphylococcus* and *streptococcus pyogenes* and *aureus*. In tubercular cases the tubercle bacillus may be present, and in pneumonia the *diplococcus pneumoniæ* has been met with.

In those rare cases in which a large pleural effusion leads to sudden death, the lung on the affected side is often found to be almost completely airless, and the other lung extremely cedematous. It is sometimes thought that the heart is displaced in these cases by the effusion, and that syncope may have been induced by this alteration of position of the heart leading to kinking of the aorta. In our experience of such cases the heart has not been markedly out of position, and nothing abnormal has been detected as regards the aorta. On the other hand, the hitherto sound lung has always been excessively cedematous, and to this cause we ascribe the death of the patient.

Treatment.

In simple uncomplicated dry pleurisy but little treatment is required. Pain may be alleviated by the application of warm fomentations, or of an ice-bag, to the chest wall. In severe cases it may be advisable to apply a few leeches, much relief generally following this procedure. In some cases strapping the chest, by limiting its movements, greatly relieves pain. The administration of opium by the mouth may be desirable in order to give the patient rest. In all cases, the bowels should be well opened.

When effusion has occurred, the mode of treatment will depend upon its cause, its nature, and its quantity. In mild cases of clear effusion, in which the constitutional symptoms are slight, rest in bed, with counter-irritation and the administration of quinine and iodide of potassium, will probably suffice. But whenever the amount of effusion is large, it may be necessary at any time to take measures for its removal. Whenever serious dyspnoea occurs then aspiration must be performed, also whenever the effusion is double. And in cases of pleurisy with effusion in children, the fluid should be withdrawn. The well-known tendency of the effusion to become purulent in such patients renders it imperative to resort to its removal at the earliest possible moment.

The above remarks apply to the treatment of effusions which are clear. When pus is present its speedy removal

is necessary in all cases. There is no safety for the patient until this is done, and on no account should the case be left until the pus begins to point. This stage should always be anticipated by operative interference.

As regards the mode of procedure, the diagnosis of the nature of the effusion must always be made by the exploring needle. Should the effusion be clear and its removal necessary, aspiration may be at once employed; it is not necessary to withdraw the whole quantity of fluid, much of which will be absorbed after the operation. Severe attacks of coughing should lead to the suspension of the operation. When pus is present the use of aspiration should be confined to the diagnosis of the nature of the effusion. When this has been definitely found to be purulent, no further aspiration should be attempted, at least in the case of children, but a free opening should be made and the pus evacuated. The evil effects of aspiration in the treatment of children's empyemata are only too well known, and it should be a cardinal rule that, whenever pus exists in the pleural cavity of a child, its removal by aspiration is inadmissible. If this procedure be resorted to the pus rapidly reaccumulates, and the result is that the operation must be performed again and again. The patient gets weaker and weaker, the chest falls in, and death finally ensues from hectic or lardaceous disease. We emphasise this point, as it is one of the greatest importance.

When pleurisy complicates other diseases, such as phthisis, the treatment is that of the disease upon which the pleurisy depends. In phthisis, dry pleurisy is often distinctly beneficial, as by the obliteration of the pleural cavity the subsequent development of pneumothorax becomes impossible.

In all cases of pleural effusion, and especially when empyema is present, a nourishing diet, a moderate use of stimulants, and a bountiful supply of pure air are of the first importance. Cod-liver oil is often of great value, and the administration of iron and quinine may also be useful.

HYDROTHORAX

HYDROTHORAX is the term applied to accumulations of serous fluid in the pleural cavity, not due to inflammatory conditions of the pleura, but occurring in cases of morbus cordis, renal disease, and in other conditions leading to oedema and engorgement of the veins and capillaries, such as pressure of a tumour or aneurysm on the vena cava.

Symptoms. The physical signs and symptoms of the affection are precisely similar to those already described as occurring in pleural effusion due to inflammation.

Hydrothorax, being the result of general conditions, is always double, although the quantity of fluid present on the two sides may differ considerably. The condition is a very grave one, not so much on account of the hydrothorax, but from the presence of those maladies which give rise to the disturbance of the circulation upon which the chest symptoms depend.

Oedema of the lungs is very frequently present in combination with hydrothorax, but in some cases the pressure of the fluid is so great that the lung is collapsed, airless, and presents those appearances to which the term "carnification" is applied.

Treatment. This is that of the disease to which the hydrothorax owes its origin. Removal of the fluid by aspiration may lead to temporary improvement of the breathing; but, as the causes remain, the reaccumulation of fluid can only be a question of time, perhaps merely of hours.

HÆMOTHORAX

HÆMOTHORAX is usually due to traumatism, such as injuries causing fractures of ribs and consequent damage to the lung. But in some cases the pleural cavity may contain blood as the result of rupture of an aneurysm, or of a pulmonary vomica containing a ruptured aneurysmal dilatation of an artery. Diathetic diseases, such as scorbutus or the hæmorrhagic tendency, are also occasionally attended with hæmorrhage into the pleural cavity.

The symptoms of hæmothorax, if the blood is poured out in any quantity, depend, of course, upon the cause of the hæmorrhage. When the latter is due to the rupture of an aneurysm, death follows immediately. In other cases the patient generally complains of great pain on the affected side, and speedily passes into a condition of collapse and profound anæmia. The respiration is naturally greatly embarrassed. When the blood is effused more slowly, the symptoms are the same, but of more gradual development. Symptoms.

As regards the physical signs, these are, of course, the same as those of pleural effusion, and from them alone it will be absolutely impossible to form the diagnosis.

All cases of hæmothorax are very serious, as the effusion of blood depends on conditions in which the prognosis is of the gravest. If the immediate danger of collapse is tided over, it is very probable that acute pleuritis, probably suppurative, will result from the irritation of the clot.

Rest is the great principle of treatment in these cases, and as little interference as possible. Ice-bags may be applied to the chest, and the usual hæmostatics can be administered. Unless life is threatened by the pressure of Treatment.

the effused blood upon the lung, no attempt should be made to remove the accumulation by aspiration. Indeed, the latter procedure is generally useless, on account of the presence of clotting. Under these circumstances the only further step that can be taken is the opening of the pleural cavity by surgical operation and the removal of the clotted blood.

PNEUMOTHORAX

THE symptoms of pneumothorax, or the entrance of air into the pleural cavity, are very marked and definite. There is sudden violent pain in the side of the chest, followed immediately by most urgent dyspnœa. The patient is restless, greatly distressed and agitated, and is probably more or less cyanosed. The frequency of the respiration is greatly increased, and the pulse is very feeble and rapid. Symptoms of collapse may speedily set in, and the death of the patient may ensue in a short time only from the commencement of the illness. But in the majority of cases, after the lapse of a certain time, the dyspnœa becomes less urgent, and the patient, if he remains quiet, is fairly comfortable. In some cases recovery is uninterrupted and complete, but in by far the larger number the pneumothorax becomes complicated with the development of a large pleural effusion, which may even be purulent. Under such circumstances the pressure on the affected lung, already severe from the air in the pleural cavity, is greatly increased, and the chances of its re-expansion are very slight. Symptoms.

The physical signs of pneumothorax are immobility of the affected side, together with undue prominence of the intercostal spaces. The percussion note is hyper-resonant, and in some cases a "cracked pot" note (*bruit de pot fêlé*) may be elicited. On auscultation there is a weakness or absence of breath sounds, with a peculiar effect obtained on percussion. If one coin be struck against another which is held applied to the chest wall, a special character is given to the percussion note when pneumothorax is

present; the note assumes a bright, metallic sound ("bell sound"), which is quite easily recognised, and is perfectly characteristic. Another characteristic sound is that known as *metallic tinkling*. This consists in a peculiar dropping sound of high metallic *timbre*, which is sometimes heard spontaneously, but is more frequently elicited when the patient coughs. It may possibly be due to drops of fluid falling in the air-containing pleural cavity, or perhaps is a crepitation in the lung modified by the presence of the pneumothorax. Should the breath sounds become again audible, or should they remain audible throughout, as is occasionally the case when the opening between the lung and pleural cavity remains patent, they always acquire an amphoric character. In other words, the breathing resembles that which is audible over a pulmonary excavation or vomica. The voice occasionally has the same amphoric quality when auscultated over the affected side.

A very characteristic, and indeed a classical, sign of the presence of pneumothorax is the *succussion* sound, which is a splash possessing the same metallic quality audible when, during auscultation of the affected side, a smart shake is given to the body of the patient.

It need scarcely be said that, just as in fluid effusion into the pleural cavity, the mediastinum, together with the heart, is pushed over to the healthy side. It has been mentioned that pleural effusion ensues in cases of pneumothorax; as a rule, this takes place in no long time, and very often the effusion rapidly becomes purulent. Thus, in addition to pneumothorax, empyema is also present.

Causation
and Morbid
Anatomy.

Pneumothorax may be due to injury of the chest wall, causing damage to the lung, in which case it usually comes under the observation of the surgeon.

It may also occur in old cases of empyema which have been operated on, and in which a fistulous opening exists. In this case the pneumothorax is local, and is enclosed by adhesions.

As seen by the physician, pneumothorax is generally the

result of chronic phthisis, and is due to the perforation of the pleura by a pulmonary cavity; it may, however, occur in quite early phthisical lung disease, from the softening of a patch of tubercular deposit which is situated immediately beneath the visceral pleura. Further, pneumothorax may ensue during the progress of gangrene or of malignant disease of the lung.

The post-mortem appearances in death from pneumothorax are generally those found in cases of purulent pleural effusion, as the production of empyema is the almost invariable result of a pneumothorax which does not terminate fatally within a comparatively short time. In recent cases, when there has not been a sufficient interval of time in which empyema can develop, the opening of the affected side of the thorax may be accompanied with an obvious escape of air from the pleural cavity. The lung will, of course, be found compressed and airless, and a careful examination may reveal the aperture by which the air gained access to the pleural cavity.

In some cases the pneumothorax is localised, especially when it depends upon old empyema. The mediastinum and heart are displaced to the sound side, and the liver, too, may be depressed. The remaining appearances will be those special to the condition upon the presence of which the pneumothorax depends.

The patient must be propped up in bed in that posture which he finds most easy. Aromatic spirits of ammonia and spirits of ether should be given frequently, but above all other means of relief is the subcutaneous administration of morphia. This injection should be resorted to at once, and be repeated if necessary. In some cases where extreme distension of the pleural cavity is present, much relief may be obtained by aspiration of the upper portion of the affected side of the chest by a fine needle—of course, with the object of removing some of the air contained in the pleural cavity. Empyema secondary to pneumothorax

Treatment.

must be treated on the usual principles. When pneumothorax is a complication of phthisis there is generally but little hope of any real improvement, and the case in no long time terminates fatally.

CHYLOTHORAX

THIS is a rare affection, in which an accumulation of chylous fluid takes place in the pleural cavity of one or other side.

The symptoms of chylothorax, as well as the physical signs of the same, are absolutely indistinguishable from those of ordinary pleural effusion, and it is impossible, by physical signs alone, to establish the diagnosis. In order to determine the presence of chylothorax, resort must be had to the exploring syringe. When this instrument is employed, it will be found that, instead of the usual appearance of fluid effused into the pleural cavity, the aspect of the fluid withdrawn is milky, and somewhat thick; it may, on standing, separate into two layers, a lighter, creamy-looking upper stratum and a thicker lower layer, which may, in some cases, show a tendency to coagulate. Under the microscope, numerous fat globules will be detected, and by the use of osmic acid all doubts as to the nature of these globules will be set at rest, as they immediately blacken when treated with the acid. Symptoms.

In a case which came under our observation, the patient first complained of shortness of breath on exertion; when seen, there were the usual signs of fluid effusion, and characteristic chylous fluid was withdrawn by the syringe. In this case no apparent cause for the symptoms and physical signs existed, and two years after the commencement of the illness the condition was practically unaltered.¹

The causation of this malady is obscure. In some cases it may be that a communication has been set up by Causation
and Morbid
Anatomy.

¹ *Vide* "Clinical Journal," No. 408, Vol. XVI., No. 18, where the case is reported *in extenso*.

tubercular or other ulceration between the thoracic duct and the pleural cavity ; but in many, such as the one to which allusion has already been made, no adequate cause of the affection can be assigned or even conjectured. Recent researches on the relations existing between the lymphatic system and the veins by Mr. Cecil Leaf¹ and Dr. Richard Boddaert² have proved the existence of communications between the thoracic duct and the vena azygos ; such communications being multiple, and effected by more or less horizontal channels uniting the vessels. This being the case, it is possible that, owing to a previous pleurisy giving rise to a thickening of the parietal pleura, an obstruction may have occurred which may prevent the chyle obtaining access to the vena azygos by these cross branches. Under such circumstances, the raised tension in the thoracic duct may have led to the escape of chyle through its walls ; or from the same increase of tension, rupture of the cross branches might conceivably have ensued. In either case, chylous fluid would obtain access to the pleural cavity. We are indebted to Mr. Cecil Leaf for the details of his most interesting and important research, which must have the closest connection with the explanation of the occurrence of such obscure maladies as that now under discussion.

Treatment.

It will be obvious that it is impossible to lay down rules for the management of such an extremely rare malady as chylothorax. So few cases have been recorded, and the pathology of the affection is so imperfectly understood, that it is not possible to point out what treatment is adapted to the particular instance. Common-sense measures must be resorted to, and, of course, if the symptoms demand such interference, paracentesis must be performed. It may be advisable to administer iodide of potash, on the assumption that syphilis has been a causative agent.

¹ "Blood Vessels and Lymphatics," *Lancet*, 1900 ; p. 606. "The Surgical Anatomy of the Lymphatic Glands," 1898.

² "Étude sur une Communication Exceptionnelle entre le Canal Thoracique et la Veine Azygos chez le lapin."—Par RICH. BODDEART, Gand, 1899.

DIVISION IV
DISEASES OF THE DIGESTIVE SYSTEM



DISEASES OF THE DIGESTIVE SYSTEM

As in the case of diseases affecting the respiratory and circulatory systems, those of the digestive organs are to be diagnosed by the orderly employment of inspection, palpation, percussion and auscultation. But there are special difficulties which attend the detection of maladies affecting the various organs situated within the abdominal cavity. The difficulties arise from the close proximity of these organs, and from the contractility of the abdominal muscles, which very often indeed greatly interferes with the adequate examination of the liver and intestines by interposing an insuperable barrier to the employment of palpation, and which by itself not unfrequently simulates, through involuntary contraction of the rectus abdominis muscle, the presence of a tumour.

In examining the abdomen the points of the fingers should never be used, but the whole hand should be laid flat upon the surface, and, the patient's attention being distracted by conversation, it will generally be possible, by careful movement of the hand, to thoroughly explore the underlying viscera. If the tips of the fingers be used for this purpose, contraction of the muscles will be instantly excited, and all further proceedings will be absolutely useless.

It is well to bear in mind that, in investigating the condition of the liver, little or no importance attaches to the results obtained by percussion. The constant presence of coils of intestine between the liver and the wall of the abdomen renders it almost impossible to obtain satisfactory evidence of the liver being enlarged in this way. The only effectual method of obtaining evidence regarding the shape,

size, and consistence of the liver is that of palpation ; but much practice is required before this can be satisfactorily performed, and it may be in some cases that rigidity of the abdominal walls renders all attempts to ascertain the condition of the liver, and of the abdominal contents generally, futile. When this is so and the matter is urgent, it is best to administer an anæsthetic, for by this means complete laxity of the abdominal walls is obtained, and examination is rendered easy.

Sometimes the detection of fluid which lies free in the peritoneal cavity is attended with some difficulty. The chief signs of ascites are dulness in the flanks, which alters with the position of the patient, and a thrill which is obtained when a gentle tap is administered on one flank, while the hand placed flat on the corresponding point of the opposite side receives the resulting impulse.

These signs are by no means infallibly present, and, as a matter of fact, large quantities of fluid are not seldom effused when both are more or less in abeyance. In such cases the dulness due to the presence of fluid is obscured by the tympanitic note which is the result of the gaseous intestinal distension ; as regards the fluid thrill, this is not always easily obtained even when large quantities of fluid are present.

DIET OF INFANTS AND CHILDREN

It is impossible to over-estimate the importance of a thorough knowledge of the principles of the correct feeding of infants and young children. Without this knowledge nothing can be effected by the use of drugs alone, which at this time of life play a completely subordinate part in the treatment. Hence it behoves the student to give special attention to this subject. This warning is the more necessary, as instruction at the medical schools on the feeding of infants and children is totally inadequate. If referred to at all, the matter is treated of in far too general terms ; and it is of no use in practice for the student to have this general knowledge ; what he requires are definite and precise rules of guidance.

The shocking ignorance of infant dietetics met with in the out-patient room is by no means confined to the mothers there assembled. Similar ignorance and recklessness are met with in the easier classes, and the student will find that a thorough knowledge on this most important matter will be invaluable in every kind of practice.

Mistakes are of two kinds in infant feeding. In the first place, the food given is not suited to the requirements of the baby : and secondly, if suitable, it is given in improper quantity and at improper times. When the mother's milk agrees, nothing else is required until the child approaches the ninth month, when weaning should be gradually commenced. But the child is often put to the breast much too frequently ; whenever it cries, or is fractious, it is suckled to quiet it. It is needless to say that such procedure tends to upset the stomach and bowels, with the

result that vomiting and diarrhœa ensue. Up to three months old, children should not be put to the breast more often than every two hours; after this period, the interval between suckling should be three hours, gradually increased to four hours at seven or eight months.

When suckling is impossible, the question of artificial feeding must be faced. The greatest attention should be given to the cleanliness of the feeding apparatus; after each meal the bottle should be thoroughly washed and placed in clean water until next required. The long feeding tubes hitherto in use should be entirely discarded. It is impossible to efficiently clean such tubes, and their use should be replaced by that of the short nipple, now easily procured at any chemist's.

As a general rule, nothing is better than cow's milk, which has been previously boiled and allowed to cool. But it must be borne in mind that the flakes of casein in cow's milk are much larger and denser than those of human milk, and are hence less easily digested. For this reason it is advisable to combine cow's milk with barley water, which tends to break up these large masses of casein. In a newly-born child the proportion should be two-thirds barley water, and one-third, or even less, cow's milk; after two months this proportion can be gradually increased as regards the milk, until at six or seven months equal parts of milk and barley water may be given. Later than this, the barley water may be diminished to one-third.

In many cases, and with the most careful attention and foresight, the infant cannot tolerate cow's milk in any form. In such circumstances, recourse must be had to some other kind of alimentation. Whey and barley water, or bread jelly, is a very good basis for artificial feeding, but cream must be added in the proportion of twenty drops to half a bottle. And in many cases it is advisable to add to the other constituents of the food raw meat juice. This combination is an excellent one, and is most serviceable in many rebellious cases of vomiting, diarrhœa, and wasting.

A few words must be added on the subject of artificial foods for infants, of which at the present day the name is legion. These foods are useful as auxiliaries, but are under no circumstances to be used alone. They all contain an excess of starchy matters, although in some the starch is more or less converted into grape sugar; many contain a large quantity of cane sugar, and not one is adapted to be itself a sole food. But they have their use when combined with cow's milk and with cream. In cases of difficult digestion, with griping, flatulence, and diarrhœa, the careful employment of one or other of these foods, with proportional reduction in the quantity of milk, may have very good results. The great point to remember—one which is too often forgotten—is that they are merely helps, and can in no sense be regarded as substitutes for milk.

Weaning, commencing at nine months, should, in all cases, be completed by the time the child is a year old. Out-patient experience will soon convince the student of the evil results of prolonged lactation, and of the connection between this condition and rickets. At about twelve months of age the child may have, in addition to a pint and a half of milk per diem, a slice of bread and butter, the yolk of an egg, and a little mashed potato and gravy. Not until the child is sixteen or eighteen months old should he be allowed to have meat. At that age he may have a tablespoonful of beef or mutton, previously carefully pounded in a mortar; and it is well to vary this on alternate days with an egg, or gravy and potato. It should never be forgotten that during childhood, and not merely in infancy, milk should still be the staple article of diet, and the morning and evening meals should always be composed largely of this food.

One other matter should be mentioned with regard to the bringing up of infants and children. They should not be drugged more than is absolutely necessary; the habit of administering aperients to children for all and every ailment is a pernicious one, and may cause abiding weakness of the

bowels, to be a plague to the victim of drugging during his adult life. Attention to diet and the avoidance of excess of sweets and pastry will render the administration of aperients unnecessary.

POISONING FROM FOOD

VERY severe symptoms may, under certain circumstances, follow the ingestion of various articles of diet. The latter may be obviously in a more or less decomposed condition, as in the case of unsound, over-ripe fruit, but in other cases nothing repulsive to either taste or smell may be noticeable. Canned and tinned meats seem especially liable to produce such symptoms, though themselves apparently in a state suitable for human consumption. Much obscurity surrounds these cases, which are known as those of *ptomaine poisoning*. Apparently some toxin is generated by the action, probably, of a micro-organism present in connection with putrefactive processes. It must be remembered that the latter are not always obvious to sight, smell, or taste.

The symptoms in these cases may ensue immediately after the ingestion of the peccant materials, or not until after the lapse of many hours. It may be as long as thirty-six hours, or even longer. The patient complains of griping abdominal pain, speedily followed by vomiting and diarrhœa. The latter symptoms may be very severe, and attended with marked collapse, so that the case presents many of the features of an attack of cholera.

The symptoms induced by mussel poisoning are of a similar nature, marked collapse being often present, in which death may occur. These attacks are especially common in the autumn, when there is a large consumption of fruit in a more or less questionable condition.

In other cases, severe nervous symptoms, headache, cramps, and twitching of muscles may be present. Occasionally the temperature is raised, but a marked elevation

of the body heat is not a frequent physical sign. Most cases end favourably in the course of a few days, but death is not altogether unknown, especially in the very old, and in those who are already suffering from other maladies.

Poisoning may occur through the milk supply, by which scarlatina, diphtheria, typhoid fever, and possibly tuberculosis may be induced. Epidemics of severe diarrhoea and vomiting, with serious depression, have been traced in large cities to the consumption of the ice-creams sold in the street by itinerant vendors. Bacilli have been discovered in these cases to which apparently the symptoms are due.

In Italy outbreaks of illness have occurred through the consumption of diseased maize. The symptoms induced have included skin eruptions of erythematous nature, together with diarrhoea, debility, loss of appetite, and severe headache. To this malady the term *pellagra* has been applied. The subject requires further investigation.

The disease due to the ingestion of grain affected with the malady caused by the *claviceps purpurea* is well known as *ergotismus*. In this affection spasm of the arterioles is induced, by which the blood supply to the extremities is more or less cut off, with the result that gangrene ensues. And the prolonged use of the diseased grain causes also mental symptoms, and even epileptic attacks.

It is scarcely necessary to say that the treatment of all these conditions is prophylactic, and consists in the avoidance of articles of diet which are in any way suspicious.

In cases in which the symptoms of poisoning are acute, a timely purgation may assist nature in getting rid of the irritating matters. Nothing is better for this purpose than castor oil, which may be given in full doses so long as there is evidence of the presence of morbid matter in the intestinal canal. If marked depression be present, the administration of stimulants will be necessary. Other symptoms must be treated on general principles.

I. DISEASES OF THE MOUTH, FAUCES,
AND ŒSOPHAGUS

STOMATITIS

STOMATITIS is a malady chiefly seen in young children, but is also met with occasionally in older people. It is generally due to digestive disturbances, and in infants to the gross errors in diet of which they are so commonly the victims. It may also occur as a complication in general diseases, such as scorbutus, and may be due to the irritation of decayed teeth, or to excessive smoking.

The lesion is inflammatory in nature. In the milder cases it is simply catarrhal inflammation, but in the more severe phases of the malady ulceration may occur.

Stomatitis Simplex

In the mild form of this affection inflammation arises usually at the junction of the teeth and gums, this region becoming unduly red and slightly swollen. From this point the inflammation may extend more or less throughout the mouth, causing considerable pain in mastication, and in movement of the tongue and lips.

As a rule, the condition rapidly improves when appropriate treatment is adopted. But in some cases it may assume a severe form, though still without ulceration. Under such circumstances salivation may ensue, and the teeth become loose, and finally drop out.

Stomatitis Ulcerativa

This variety of the malady is particularly common in children. Like the preceding, it commences at the junction

of the teeth and gums; inflammatory redness and swelling are very marked, and the latter may be so considerable as to cover the teeth with spongy protrusions from the gums. These outgrowths are very tender, and bleed freely on being manipulated. The inflammation may spread to the mouth generally, but is usually most marked in the locality where it first commences, namely, the insertion of the teeth into the gums. After a short time small, shallow ulcers are formed, and the ulcerative process may extend to the mouth generally, being attended with a foul state of the breath, and much pain and salivation. Febrile symptoms may be added to those just mentioned, and the patient becomes weak and loses appetite.

Should no proper treatment be carried out, the condition may become extremely serious, with the development of typhoid symptoms, and in some cases necrosis of the jaw may ensue, with speedy death. There can be no doubt that many cases of this description which have been recorded were in reality due to mercurial poisoning.

In all cases an endeavour should be made to ascertain the cause of the affection, and in general it will be found that some grave error in diet is at the foundation of the mischief. This is particularly the case with those in whom the malady is most common, namely, young children. With the rectification of the fault, amendment will probably soon follow. In all cases, however, this desirable object will be obtained more quickly if local treatment be adopted. Mouth washes of myrrh and borax or of chlorate of potash are useful. The administration of mild aperients is often desirable.

In the more severe cases of ulcerative stomatitis the treatment is that of the malady upon which the local symptoms depend, together with the employment of those measures which have been already alluded to.

PARASITIC STOMATITIS—THRUSH

IN this disease small white spots develop on the mucous membrane of the mouth, tongue, and throat. They are due to the presence of a vegetable parasite, the *oidium albicans*. This is a branching cellular organism, propagating itself, like the yeast plant, by budding, and setting up inflammation, with detachment of the epithelium from the mucous surface. This epithelium, mixed up with the fungus and with particles of food, gives rise to the white spot. The spots are specially apt to be white when the diet consists mainly of milk, hence they are sometimes called "milk spots."

Thrush occurs chiefly in babies, as the result of indiscretion in diet, and of absence of cleanliness in preparing the food. In infants it is not by any means a serious disorder, but the patches give rise to some pain, causing sleeplessness and restlessness. When proper treatment is adopted in these cases, matters soon mend. When appearing in patients who are suffering from some serious disease, the prognosis is much worse; in such cases the advent of thrush may indicate that the end is not far off.

The treatment consists in cleaning the mouth as far as possible, in applying glycerine of borax, and generally in carrying out the local measures already indicated in stomatitis, together with attention to the dietary. The treatment of the disease of which thrush is a complication will, of course, be the chief indication.

APHTHÆ

THIS word is employed to describe a condition in which whitish yellow patches are developed on the mucous membrane of the mouth, tongue, and throat. They do not last long, peeling off after a short time, and leaving a sound surface beneath; but they are rapidly renewed, and by the successive formation of new patches the malady may be somewhat prolonged. Much pain is often felt in the aphthous spots.

The affection is most common in young children of a year or more. A general stomatitis is usually present, together with slight febrile symptoms and pain in mastication. The disease is due to bad and unsuitable feeding, and readily yields to treatment. The prognosis is very good.

The treatment is practically the same as that already indicated for stomatitis, namely, careful regulation of the diet, and local application of glycerine of borax.

NOMA

THIS is a disease of childhood chiefly, and the first symptoms generally noticed are those of stomatitis, which may be mild or severe. Soon the definite indications of the malady are observed ; usually it commences in the mucous membrane of the cheek opposite the molar teeth, and in the early stages consists in the formation of a vesicle which rapidly sloughs. There is much swelling of the cheek, and the breath becomes extremely, indeed overpoweringly, foetid. Much salivation ensues, and gangrene supervenes, extending its ravages in all directions. It soon travels through the whole thickness of the cheek, forming a large cavern by the destruction of the cutaneous surface. The whole side of the face may be laid open, and in some cases the inflammation and destruction have extended to the neck, and even to the thorax.

It is surprising that very often there is little or no complaint of pain, and occasionally the child never ceases to interest himself in what is going on around him and in his toys. But in some cases the pain is great, and in others, again, the patient passes into a typhoid condition, from which he can with difficulty be roused. Not uncommonly the absorption of septic matter leads to the appearance of symptoms of septicæmia, from which the patient speedily succumbs. Recovery may ensue after separation of the slough, but with great resulting deformity, which may lead to the necessity of operative measures later.

Not in all cases are the early symptoms those of stomatitis ; the development of a vesicle may be the first indication of this disease. The cheek always becomes very

hard and infiltrated, and febrile symptoms are invariably present. In some cases affecting female children, a similar gangrenous process has attacked the external genital organs.

Noma is scarcely ever seen in these days. It used to be considered as a by no means infrequent sequel of measles; but whatever may have been the case in the past, it is certain that at the present day noma is practically unknown after this fever. It has been described also as following other specific fevers, such as scarlet fever, diphtheria, and small-pox.

There can be little doubt that the disease is due to the ravages of a bacillus, though no specific micro-organism has hitherto been discovered. Cases are on record in which the disease has appeared, and proved fatal, in persons apparently in the best of health, and whose hygienic surroundings were unexceptionable.

The malady consists in a very intense form of inflammation, the severity of which is so great that necrosis speedily results. When septic symptoms supervene, they are in no sense special, being due to the absorption of decomposing matters generated at the seat of lesion.

No satisfactory treatment is known. In spite of all efforts to arrest its progress, the malady generally proceeds to a fatal termination. The affected region may be well touched with the cautery, or strong nitric acid may be applied. But although such measures may arrest the progress of the complaint, yet the respite is often only very temporary; and it is not uncommon, when the process of gangrene seems at an end, for a relapse to occur, and for the destructive process to break out afresh. The strength should be supported by appropriate diet, and stimulants will be required.

LEUKOPLAKIA

IN this condition the tongue is the seat of more or less extensive, hard, raised patches, which may give rise to no inconvenience whatever, but more usually are the seat of certain sensations of a disagreeable kind, such as numbness, and which may cause the patient much distress. In some cases real pain may be complained of. This condition of things may continue for years without any further development; but there is a certain amount of evidence which tends to show that cancer may develop in a patch of leukoplakia, and this is perhaps the greatest danger attending the malady. In association with the affection, hypochondriacal symptoms may occur, the patient being morbidly anxious about his health in general, and about his tongue in particular.

It was formerly thought that the tongue affection was a manifestation of syphilis, a relic of the disease persisting long after its other symptoms had passed away. But there are many cases in which this view of the causation of leukoplakia cannot be borne out.

More efficacious as a cause is probably the habit of constant smoking.

Histologically, the disease consists in an increased formation of epithelium, which becomes hard and horny. At the same time, an induration of the mucous and sub-mucous membrane occurs.

The removal of the patch by caustic is recommended. But in cases in which mental symptoms are present, removal of the latter symptoms does not invariably follow that of the disease.

TONSILLITIS—QUINSY

ACUTE inflammation of the tonsil may be of two kinds; in the first, the whole structure of the organ is involved, and the term *parenchymatous* is often applied to this form of the malady. The other variety is known as *follicular*, inasmuch as the follicles are especially affected, though the other structures forming the gland are also involved. The disease in the first form is generally unilateral, and if both tonsils are affected, it is consecutively rather than simultaneously.

Symptoms. The first symptom usually complained of is sore throat. This at the commencement is nothing more than a little loss of elasticity and dryness on swallowing, but rapidly develops into severe pain, which is greatly increased by attempts to swallow, and is often severe in the ear of the side corresponding to the affected tonsil. At the same time, shivering and feverishness may be complained of, the latter symptoms being occasionally very marked. It is not uncommon for the thermometer to register 103° or 104° at an early stage of the malady.

The throat is found on inspection to be deeply reddened, and on the affected side a large, prominent swelling is observed, which may almost fill the back of the fauces and extend nearly to the opposite side. This swelling is caused by the inflammation of the tonsil, together with oedema of the surrounding structures. The swelling can also be felt externally in the situation of the tonsil.

The patient is now supremely uncomfortable; swallowing is very painful, yet he is constrained to repeat the act in order to remove the feeling of constriction and fulness at the back of the throat. Only fluid food can be taken, and

this with difficulty. The sufferings of the patient are greatly increased during the night, and this is partly due to the fever, which is always more acute at that time.

The urine is small in quantity, loaded with urates, and often contains a trace of albumen. The bowels are usually confined, often obstinately so.

After two or three days, during which all the symptoms increase, and pus formation occurs, the swelling suddenly bursts; the pus is either expectorated or swallowed. Immediate relief follows. The temperature falls, the difficulty and pain in swallowing vanish, and the patient falls into a quiet sleep. He takes solid food almost at once, and in a few hours convalescence is established.

Such is the course of acute parenchymatous tonsillitis when occurring on one side only. If the tonsils are consecutively affected, then the case is prolonged, and more severe. In some cases suppuration does not occur, in which event both the severity and duration of the malady are considerably diminished.

The symptoms of follicular tonsillitis, in which the glands and crypts of the tonsils are especially involved, are much the same as those just described, but are usually milder. The tonsils are swollen, and scattered over their surface are numerous yellow spots, some not larger than a pin's head. These are the inflamed follicles, with the overabundant secretion which fills them. In many cases these yellow points run together, and thus form patches. It may be by no means easy to distinguish a patch thus formed from a diphtheritic membrane. The chief points of distinction consist in the fact of there being no similar membrane on the soft palate and uvula, in the absence of albumen from the urine, in the temperature being high, while the patient is neither so obviously ill nor so depressed as in diphtheria. Further, if the yellow patch is detached, the underlying surface, though reddened and inflamed, is not raw and bleeding. As a rule, suppuration does not occur in this form of tonsillitis. In exceptional

cases the symptoms may be very severe, and the temperature high. On the other hand, not seldom very little complaint of pain is made; an examination of the throat reveals a condition which would hardly have been anticipated from the comparative silence of the patient concerning the local trouble.

Inflammation of the tonsils and pharynx, not presenting the characters of either of the two forms of the malady just described, but which is catarrhal only, is an affection very commonly observed. The symptoms are soreness and tendency to clear the throat, slight pain in swallowing, and some trifling fever. If, as is very often the case, nasal catarrh is also present, the symptoms peculiar to that malady will be added.

Tonsillitis is a disease which has a marked tendency to recur. A patient who has once suffered from the complaint is liable to its return on any slight exposure, or after being in a draught when heated. It is to be noted, too, that acute tonsillitis often leads to chronic inflammatory enlargement of the glands, and when this is the case frequent acute attacks are very liable to worry the patient. When the enlargement is chronic, the condition is often rendered evident by the appearance of the patient and by the nasal quality of his voice. The expression of the face is often somewhat vacant, with the mouth a little open. This appearance is in large measure due to the associated deafness, which is caused by the pressure of the enlarged tonsil on the Eustachian tube, and by catarrh of the latter transmitted from the inflamed tonsil. On inspection, it will often be found that the tonsils are so enlarged that they touch one another in the middle line, and thus cause serious impediment to the entrance of air to the lungs. In young children marked deformity of the chest may be the result of this obstruction.

Causation
and Morbid
Anatomy.

Perhaps the commonest cause of acute tonsillitis is that chronic enlargement of the organs to which allusion has just been made. Exposure to cold, especially when the body is over-heated, is a fertile cause of quinsy.

There is a considerable amount of evidence which tends to prove that follicular tonsillitis may be due to bad smells and general insanitary conditions, and such form of the malady appears to be infectious. Inflammation of the tonsils occurs as an intercurrent affection in the sore throat of scarlet fever, measles, and other febrile conditions; in fact, in all forms of severe pharyngitis. To this catarrhal form of the affection young people are particularly liable, but the tendency to contract it steadily diminishes with advancing years.

As regards the morbid anatomy of tonsillitis, there are no special appearances beyond those characteristic of acute inflammation.

In an acute attack of quinsy the bowels should be opened by means of compound senna mixture, or some other sharp purgative. The patient must be kept indoors. Poultices may be applied to the neck, or, if preferred, cold compresses. Small pieces of ice may be sucked in order to relieve the pain, and the act of swallowing may be rendered much easier by painting the inflamed tonsil with a solution (five per cent.) of cocaine. A Dover's powder at night will probably relieve the suffering to which the patient is peculiarly liable at this period. In some cases scarification of the swollen tonsil with a *bistourie cachée* may be serviceable. When pus is suspected in the swollen tonsil the latter should be carefully felt, and, if possible, the locality of the abscess determined. Much relief will follow the opening of the abscess. This operation must be performed with care, remembering always that the internal carotid artery lies in close proximity to the tonsil. Details of the procedure must be sought in surgical works. Treatment.

Chlorate of potash, perchloride of iron, aconite, and belladonna have all been lauded in the treatment of this painful malady. We have never seen any good results ensue from their employment. A saline mixture is all that is required, being as efficacious as the drugs just mentioned, and far less liable to upset the stomach. In follicular tonsillitis gargles

of chlorate of potash may be ordered, and the same drug, if thought fit, may be taken internally. If marked depression be present, quinine may be administered; in some cases guaiacum, in the form of the compound tincture, is of use.

In the catarrhal form of the affection gargles of borax, or of chlorate of potash, can be used, or the pharynx and tonsils may be painted over with glycerine of tannin.

In chronic enlargement of the organs, tonsillotomy is the only successful mode of treatment. It is futile to paint the tonsil with astringents, as is frequently recommended.

STRICTURE AND CANCER OF THE ŒSOPHAGUS

STRICTURE of the gullet may be the consequence of injury, as, for instance, in the case of those who, accidentally or otherwise, have swallowed corrosive poisons, such as the mineral acids. With these cases we have here no concern. It is conceivable that stricture of the œsophagus may be a result of syphilis; such cases are, however, practically unknown. The malady may own a neurotic origin, being a manifestation of hysteria. By far the larger number of cases of this disease are the victims of cancer, and to this form of the malady the following account is applicable:—

This disease may affect any portion of the gullet, but is more often found at the point opposite the bifurcation of the trachea than elsewhere, and is also frequently met with at the lower end as it passes into the cardiac orifice of the stomach; the œsophagus may even be affected throughout its whole extent.

The onset of the disease is insidious. The first symptom complained of is slight difficulty in swallowing; it may be no more than a trifling hitch felt at a certain portion of the gullet. In no long time this difficulty increases, and the patient has to overcome it by swallowing water; at the same time, pain is complained of, which may be in the neighbourhood of the cricoid cartilage, in the back, or even in the epigastrium. Soon the difficulty in swallowing and pain increase to such an extent that the ingestion of solids becomes impossible, and the diet has to be entirely fluid. In other cases there is more trouble with the swallowing of fluids than of solids. It is important to be aware that the symptoms in this disease vary in intensity: some

Symptoms.

days the patient may be almost unable to swallow, and again for a day or two the difficulty ameliorates greatly. Sometimes the patient can localise the exact spot where the obstruction occurs. He soon begins to waste, partly in consequence of insufficient nourishment due to the difficulty of conveying food to the stomach.

Careful examination at this period will generally reveal enlargement of glands at the side of the neck; this enlargement should always be sought for. From this stage of the malady onwards the failure of strength is generally rapid, and the patient may die in a few months from the commencement of the disease from exhaustion.

But special perils attend the progress of œsophageal cancer from the tendency of the new growth to attack and perforate neighbouring organs, or from its liability to become the seat of profuse hæmorrhage. One of the most frequent occurrences is perforation of the trachea, which occurs almost always just at the point of bifurcation. This accident is accompanied by terrible dyspnœa, which ensues whenever the patient swallows, and is due to the passage of ingested matter into the air passages. Death occurs very quickly after this perforation, and is caused either by suffocation or by the supervention of pneumonia from the passage of food into the lungs.

In other cases the aorta may be perforated, with sudden death from hæmorrhage. Again, the pleural cavity or lung may be the seat of perforation, in the one case with the rapid formation of empyema, and in the other with severe inflammation; in both, probably symptoms of septicæmia may arise. The left recurrent laryngeal nerve may become involved in the new growth, with resulting hoarseness of voice or aphonia, due to fixation of the left vocal cord in the cadaveric position.

In all cases of cancer of the œsophagus the portion of the gullet above the stricture tends to dilate. Thus food must accumulate in this dilatation, whence it may return to the mouth by a process of regurgitation. It has been

already stated that death may result from profuse hæmorrhage at the seat of ulceration. But small hæmorrhages, not in any way perilous to life, may supervene from time to time, and are often accompanied with offensive mucous and purulent discharges from the malignant mass.

The duration of this disease seldom exceeds a year and a half, and is frequently far shorter, not being more than a few months. It is a disease of middle and advanced life, and men are far more liable to be affected than women.

As in other forms of cancer, hereditary tendency would appear to form an important etiological factor. There is reason to believe that alcoholic propensities or previous injury, with the formation of a cicatrix, tend to increase the liability to the disease.

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At the earliest period the new growth manifests itself in the form of a nodule, or nodules, at the seat of disease. This nodule rapidly extends, and tends in a short time to involve the whole circumference of the Œsophagus. As a rule, the stricture does not occupy more than two or three inches of the length of the gullet; in exceptional cases it may, however, extend to its whole length. The new growth is generally hard, containing much connective tissue in proportion to cells; but it may be very soft and vascular. The tendency to ulcerate and bleed is marked in all varieties of the malignant growth.

Unfortunately, there is but little to be done beyond palliation of the patient's sufferings in this mortal disease.

Treatment.

When the malady is suspected, great care must be taken in using mechanical force. It is not permissible to use a hard tube, even in making the diagnosis. An error of this kind may easily lead to perforation, and the death of the patient. The strength must be maintained by the administration of nutritious food, in an easily assimilable form, at frequent intervals. When swallowing is impossible, a soft tube may be passed with great care, and the patient fed through this.

Attempts have been made to dilate the stricture with

bougies. This mode of treatment is undesirable; no permanent benefit can accrue, and the procedure is very dangerous. When it is found impossible to administer food in any way by the gullet, resort must be had to rectal feeding. Under such circumstances, gastrostomy has been performed. The results are far from encouraging, no doubt because patients, the victims of cancer, bear operations very badly. Throughout the course of the disease morphia will be required to alleviate the sufferings of the patient. It is best administered hypodermically.

It is well to take advantage of the periods of improvement as regards swallowing, which occur from time to time, in order that the patient may take as much nourishment as possible during these intervals.

II. DISEASES OF THE STOMACH AND INTESTINES

DYSPEPSIA

DYSPEPSIA is a malady of which the symptoms are many and various. At first they are usually slight, consisting in uneasiness and sense of fulness after meals, coming on perhaps in the course of twenty minutes or half an hour. Flatulence is frequently complained of, and the bowels are often constipated. The appetite is usually more or less impaired, headache is troublesome, and *muscæ volitantes* often annoy the patient. Symptoms.

One very usual form of dyspepsia is acidity or heartburn. About half an hour, or longer, after a meal, a disagreeable sensation of warmth is experienced in the epigastrium; this soon develops into a painful sensation of burning, and is accompanied with a feeling of nausea. Sometimes retching occurs, the patient bringing up small quantities of fluid which is clear, and very acid. In severe cases of dyspepsia the nervous symptoms may be a marked feature of the case. The patient falls into a gloomy, introspective condition, imagining himself to be very seriously ill, and in not a few cases real hypochondriasis may supervene. In all severe and prolonged cases, the general health suffers. The patient loses flesh, becomes of an unhealthy, earthy aspect, and is easily tired and out of breath.

The exciting causes of dyspepsia are legion, but when reduced to their elements are generally found to be connected with dietetic errors in a subject of gouty ancestry, or in the sufferers from anæmia and constipation. Other causes are overwork, insufficient exercise, nervous anxiety, hurrying over food, bad teeth, leading to imperfect Causation.

mastication, bad hygiene, such as sleeping in a room with insufficient ventilation. In young children dyspepsia is a very common malady, due to the unsuitable diet which is so generally employed during infancy and childhood. This subject is specially discussed in a separate article.

Dyspepsia is a functional disorder, and the post-mortem appearances are absolutely *nil*. The complaint is due to alterations in the physiological functions of the stomach, such as too profuse or too scanty a secretion of gastric juice. Our knowledge of the chemistry of digestion is far from satisfactory, and it is impossible, at the present time, to classify the different forms of dyspepsia according to their chemical basis.

Treatment.

This consists in a rigorous regulation of the diet and mode of life. All indigestible food must be prohibited, and, as far as possible, the diet must be limited to plain joints of beef and mutton. Milk may be freely taken. Alcohol in all forms must be prohibited; so also must the use of tobacco, which is a virulent cause of dyspepsia. The patient must have adequate, well-cooked meals; the state of the teeth must be inquired into, and if found defective, must be rectified; anxiety and worry should be obviated as far as possible, and the patient must not work late at night. Constipation must be combated; for this purpose, aloes, iron and nux vomica, form a suitable combination. Alkalies, hydrocyanic acid, the mineral acids, bismuth, are all more or less useful in the different phases of this complaint. Papain, in the irritable form, is often of great use. It must be given, when combined with alkalies, in the form of a powder, as it forms moulds in alkaline solution; but with acids it may be used in liquid form. Pepsin is also useful in delayed and feeble digestion. Flatulence will require the administration of carminatives, *e.g.*, Sp. ammonii aromat., aq. menth. pip., etc. In some cases a small blister over the epigastrium will relieve the pain of dyspepsia.

Only in exceptional cases will it be necessary to resort

to washing out the stomach, the so-called "lavage" treatment.

It must never be forgotten that the treatment of dyspepsia consists far more in strict regulation of the diet and in the employment of common sense than in the giving of drugs. Unless this important point be borne in mind, no good results will follow the most skilful administration of the different remedies.

GASTRIC CATARRH

Symptoms. THIS malady occurs in two forms, *acute* and *chronic*. In the acute form, the symptoms appear suddenly after indiscretion in diet or other exciting cause. The patient complains of pain in the epigastrium, which may be severe, but is more often in the nature of discomfort and fulness. He is much troubled with eructation, and a feeling of nausea is often the prelude to a violent attack of sickness, by which he is greatly relieved. The breath is offensive, the tongue coated with a white or brown fur, and the bowels are confined, but occasionally a smart attack of diarrhœa ensues.

In severe cases a rise of temperature occurs, but generally fever is entirely absent.

The symptoms above detailed are of short duration, and in the course of three or four days the patient has made a satisfactory recovery.

Causation. Acute gastric catarrh nearly always depends upon errors in diet. The food may be wholesome, but if taken in excessive quantity, and especially if of a rich nature, gastric catarrh results. Should the food be tainted in any way, the same effects may ensue. Alcoholic excesses are especially prone to induce this disorder. It is not possible to say exactly what changes occur in the gastric mucous membrane in this affection. Not being a fatal malady, the possibility of studying the subject from this point of view does not present itself. Probably the changes are confined to hyperæmia of the mucous membrane, with increased secretion of mucus. That these alterations quickly pass off is certain, and it is only in cases of repeated attacks that the mucous membrane tends to

take on those appearances which appertain to the morbid anatomy of chronic gastric catarrh.

A word must be added on the occurrence of acute gastric catarrh in children. In them much difficulty may arise in forming a diagnosis, on account of the strong resemblance between the symptoms of enteric fever and those of gastric catarrh.

Contrary to what occurs in adults, gastric catarrh in children is very commonly indeed associated with considerable fever. The fever being accompanied by loss of appetite, furred tongue, headache, lassitude, and possibly irregularity of bowels, a condition results which is absolutely indistinguishable from that of enteric fever. In fact, a synonym of typhoid fever, "gastric fever," owes its origin to this resemblance between the two diseases. Before the two affections were clearly differentiated, many cases of enteric fever were described as "gastric" fever; the latter term should now be dropped. Frequently it is practically impossible to say, in a given case, whether the child is suffering from gastric catarrh or from enteric fever. When this is so, the diagnosis must remain in suspense until careful watching of the patient shows which malady is actually present.

By aiding nature in acute gastric catarrh, we shall quickly cure the patient. Nature's mode of cure is by vomiting or diarrhoea, sometimes by both. If, therefore, vomiting has not occurred, copious draughts of hot salt and water will speedily provoke it, or emetics, such as ipecacuanha, may be given. Vomiting may also be induced by apomorphia used subcutaneously. Treatment.

The patient should be starved for a day or so, nothing being taken but water, or milk and water. On no account should alcohol be administered. If constipation be present, calomel may be given. The ordinary diet should not be resumed until after the lapse of three or four days, or until all traces of catarrh have passed off.

In children, when the malady is clearly the result of

over-eating, similar treatment may be employed. But in those difficult cases in which it is not possible to say whether enteric fever or mere gastric catarrh is present, a waiting policy should be adopted, and the patient carefully watched, being fed only on liquids, no aperients being administered.

Symptoms.

Chronic Gastric Catarrh.—In this form of the malady the symptoms are altogether less marked than in acute catarrh of the stomach. They develop also gradually; at first they are very slight. Some uneasiness after food is complained of, with perhaps impairment of appetite; a disagreeable taste in the mouth may be noticed, and in some cases pyrosis occurs, *i.e.*, the return to the mouth from the stomach of a sourish-tasting liquid. Pain is often absent, but distension or sense of fulness after food is frequently a symptom. The bowels are nearly always irregular; there may be constipation or a tendency to diarrhœa, and often these two tendencies alternate. The urine is frequently loaded with urates on standing, and the tongue is more or less coated.

When these symptoms have persisted for a longer or shorter time, the general health suffers to a variable extent. The patient gets thin and sallow-looking, sometimes with dark circles round the eyes; he becomes mentally depressed, and often is inclined to take the gloomiest view of his circumstances and of life in general. The course of chronic gastritis is a long and tedious one; even when the greatest care is taken both in diet and hygiene, relapses are extremely likely to recur.

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Errors in diet and alcoholic excesses, the latter especially in the form of "tippling," are fertile causes of chronic gastric catarrh. The condition also supervenes in the course of any malady which induces a difficulty in the return of blood from the stomach. Hence it is always present to a greater or less extent in *morbus cordis* when the compensation has failed; it occurs also in cirrhosis and other diseases of the liver. Rapid eating and imperfect

mastication of the food are very frequent causes of this malady; when the teeth are defective it is, too, of frequent occurrence. Gouty subjects are often troubled with gastric catarrh, and in some cases it remains as a heritage of some fever from which the patient has suffered, especially enteric fever. In those predisposed, tobacco-smoking will often bring on the complaint, and always aggravates it when already present.

The morbid changes consist in a chronic hyperæmia of the stomach, the mucous membrane of which may become thickened, and in the presence of an increased secretion of tenacious mucus which covers to a greater or lesser extent the whole mucous surface of the organ. In severe and prolonged cases microscopical changes have been detected in the gastric glands, the epithelium of which becomes granular or fatty. At the same time new growth of connective tissue in the sub-mucosa tends, by its contraction, to obliterate the glands, and causes that thickening of the membrane itself which has already been referred to.

Regulation of the diet, the avoidance of alcohol and of the use of tobacco in any form, attention to the state of the teeth and to mastication being properly performed, these, together with healthy surroundings, are the most important factors in the treatment of this disease. In some severe cases washing out the stomach will be found a useful procedure. Drug treatment is entirely subordinate to the means already detailed. Bismuth, alkalies, papain, and pepsin all have their uses. In some cases, better results are obtained by the employment of dilute hydrochloric acid. It is not wise to make too extensive use of peptonised foods. Such materials are useful in certain cases and in certain conditions, but they are at the present day too much relied on. In every event the state of the bowels will require attention. Constipation must be remedied, but strong purgatives should on no account be used.

In those cases in which the condition depends upon

structural disease of the heart, liver, and other organs, no treatment will be effectual unless measures are adopted which will relieve the venous engorgement, upon the presence of which the morbid state of the stomach depends.

ULCER OF THE STOMACH

THIS is by no means an uncommon affection, and is not infrequently observed in young women, though met with at all ages, and also in both sexes.

As a rule, the symptoms of ulcer of the stomach are clear and well defined. Almost always the first trouble complained of is pain after food. The time at which the pain commences after eating naturally varies considerably with the quality of the food, but, as a rule, it is within half an hour after a meal; it may, however be within a few minutes, or, indeed, almost immediately the food reaches the stomach. The pain is usually referred to the epigastrium, and not infrequently the patient can localise the exact spot, which may be covered, as it were, by the tip of one finger. On the other hand, the pain may be diffused, or even felt in the back; it may be of aching or burning character. Symptoms.

The next symptom usually encountered is vomiting. This, again, may occur immediately after eating, by which the stomach is at once emptied and the pain relieved; or it may be at a later stage, even some hours after food.

Very significant when it occurs in connection with pain and discomfort after food is hæmatemesis. The blood is black usually, and may be in very large quantities. When hæmatemesis occurs, melæna naturally ensues.

It can easily be understood that with even a short persistence of such symptoms as these the bodily health suffers greatly, and one of the prominent symptoms of gastric ulcer is the wasting which results. The patient gets progressively thinner, and his face acquires an

emaciated, drawn, painful expression, very characteristic of the disease. When the abdomen is palpated, he complains nearly always of tenderness on pressure in some part of the epigastrium, often a very localised tenderness. In nearly all cases of gastric ulcer the thinness of the abdominal wall enables the pulsation of the aorta to be well felt, and this pulsation is sometimes so excessive as to suggest the existence of aneurysmal dilatation.

These are the symptoms of ulcer of the stomach. If properly treated, the ulcer may heal and the patient recover, but even in the most favourable cases the disease may again become active unless the most scrupulous care is observed in diet. The ulcer may perforate into the general peritoneal cavity if no adhesions exist, causing death from peritonitis; or, if adhesions have occurred, it may cause an abscess, which may give rise to symptoms of pyæmia. Such abscess may perforate the diaphragm, and its contents enter the pleural cavity, whence they may be discharged through a bronchial tube. Death may ensue as the result of severe hæmorrhage coming from the surface of the ulcer. Without any of these events happening, the patient may sink and die from exhaustion, or from the effects of intercurrent pneumonia.

In some unusual cases the symptoms of gastric ulcer are quite latent, and the first real indication of its presence is peritonitis, due to perforation. It is important to bear this fact in mind in regard to this class of case. Poisoning has often been thought of, when really the symptoms are entirely due to the perforation of a latent gastric ulcer. A healed gastric ulcer may cause great deformity of the stomach by contraction of the cicatrix; if situated near either orifice, the latter may be greatly stenosed from this cause. Cancer may take its origin in an ulcer of the stomach. In ulcer of the stomach, the free hydrochloric acid of the gastric juice is often remarkably increased in quantity.

Ulcer of the duodenum is not a common affection, much

less so than ulcer of the stomach. The symptoms to which it may give rise are not distinctive, and in many cases it is impossible to make the diagnosis. Certainly in some cases no symptoms have been present before fatal perforation occurred. In a few instances complaint has been made of pain after food and nausea, but in a case of this kind which came under our notice the pain was slight, existed for a few days only, and did not prevent the patient going to work. This man died of acute peritonitis, caused by perforation of a duodenal ulcer, the only symptoms of which were as just described.

The details of the following case, which also came under our observation, will show how extremely uncertain and indefinite the symptoms of duodenal ulcer can be. A middle-aged man who had served as a soldier in India, but who had lived in England for many years since leaving the army, was suddenly seized with profuse melæna. This was the only symptom, but it was a serious one, on account of the great loss of blood. It was considered that the case might be one of cirrhosis of the liver in an early stage. With rest and treatment, in the course of a few days the hæmorrhage ceased, and the patient recovered. Nothing else was complained of at any time. There was no pain after food, and no nausea. About two years later the patient came under treatment suffering from the same symptoms. He died, and at the post-mortem examination it was found that the liver was perfectly normal, and that the whole mischief consisted in a duodenal ulcer, which was extremely chronic and adherent to surrounding structures. It would be impossible to make an accurate diagnosis in a case such as this, which affords an excellent example of the latency of an ulcer in this situation.

The causation of ulcer, both of stomach and duodenum, is extremely obscure. It cannot be said that we know the cause of either condition. Many ingenious theories have been elaborated to explain the facts, but none of them are satisfactory. Perhaps the best known is that of

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Virchow, who suggested that thrombosis of vessels in the stomach wall might account for necrotic changes. But the question immediately arises: What causes this thrombosis? No satisfactory answer is forthcoming to this query.

Young women have a peculiar tendency to be the victims of ulcer of the stomach, but there does not appear to be any real connection between this disease and the presence of chlorosis, as was formerly thought to be the case.

Gastric ulcer affects both sexes, but females are more liable to the malady than males.

Ulcer of the stomach may be single and small, not larger than a sixpenny piece, or there may be areas of ulceration so large as to cover one-third or half the surface of the stomach. There may be mere destruction of the mucous membrane, or the floor of the ulcer may be formed of peritoneum only, the whole muscular coat being destroyed, and frequently it is found that the floor consists of the pancreas or liver, to which the ulcer has become strongly adherent before the entire destruction of the walls of the stomach. As just mentioned, more than one ulcer may be present, and it is possible that in the course of extensive ulceration the resulting wide area of destruction may be due to the confluence of several ulcers. For some reason, the neighbourhood of the lesser curvature is a favourite seat of the disease.

In cases in which death has resulted from hæmatemesis, the open vessel can sometimes be found situated in the ulcer which has caused the erosion. The walls of simple ulcers slope towards the floor of the lesion; in other words, the mucous membrane is more extensively destroyed than the muscular coat, and the latter more so than the serous membrane. This is easily seen to be the case in ulcers that have perforated. In recent single ulcer the edges are not thickened or infiltrated, but in extensive ulceration of long standing this may be found to be the case.

The characters of duodenal ulceration are in all respects the same as those of gastric ulcer.

The regulation of the diet is the most important part of Treatment. the treatment of stomach ulcer. In cases in which the diagnosis is certain, it is far better to give up the administration of food by the mouth. The patient should be fed by the rectum, and this mode of alimentation may be kept up for three weeks without any great difficulty. At the end of this time teaspoonful doses of peptonised milk may be administered, and the result carefully noted. Any return of pain or sickness should at once lead to the quantity being reduced, or to a resumption of rectal feeding. When there is reason to think that the ulcer has healed, the most careful attention must still be devoted to the question of diet. The food should consist chiefly of milk, light puddings, and fish.

The pain of gastric ulcer may render necessary the hypodermic administration of morphia. Sometimes a blister over the epigastrium will relieve it.

In convalescent cases, bismuth, alkalies, magnesia, and papain may all be useful. Should perforation occur, the only chance of prolonging the patient's life consists in speedy laparotomy. In cases of hæmatemesis, due to gastric ulcer, cold applications to the epigastrium, perfect rest in the recumbent position, and the hypodermic administration of ergotin must be employed.

CANCER OF THE STOMACH

Symptoms. CANCER of the stomach may occupy any part of the organ ; but the pylorus is, perhaps, the most usual seat of new growth, and in this position carcinoma gives rise to very characteristic symptoms. The thickening and consequent narrowing of the pylorus lead naturally to difficulty in the passage of the contents of the stomach into the intestine. As is usual in all obstructions of the intestinal tract, the portion behind the stricture dilates. Thus the stomach tends to continually increase in size, so that it may ultimately fill the whole cavity of the abdomen. At the same time, not being properly emptied, its contents tend to accumulate, and are discharged by vomiting. This vomiting has special characters ; it comes on at long intervals, it may be once or twice a day, and is very profuse. It tends to recommence at the same hour, whether morning or evening ; the vomited matters have a sour smell, and contain products of fermentation to which the odour is attributable. Very frequently *torulæ* and *sarcinæ* are found in it ; blood may also occur in the vomit, but not usually. Along with these symptoms there is great and progressive emaciation, the expression is drawn and anxious, the pulse weak, and the patient obviously very seriously ill.

As regards physical signs, the increased size of the stomach may be made out by percussion, and sometimes on gently shaking the patient, splashing may be audible. An important point in diagnosis is the detection of a hard mass due to the presence of the diseased pylorus ; this, when felt, is a very characteristic physical sign, and should always be carefully sought for. The mass varies in size, it may be as

large as a walnut or a cricket-ball. In situation it varies also ; sometimes it is detected in the epigastrium, again in the right hypochondrium, or indeed quite low down in the abdominal cavity. As a rule, the mass is rough on the surface, easily movable, and not tender on pressure. Careful observations should be made for the appearance of secondary growths ; the most usual seat of these is the liver.

It can easily be understood that in this disease the stomach is never properly emptied. There is an important caution connected with treatment to be observed on account of this condition of the stomach. Poisonous remedies should be administered with great care in such cases. One of the most usual drugs ordered is strychnine, in the form of liquor strychninæ. We have seen a case in which the drug was administered three times a day for several weeks. The result was the appearance of tonic spasms, for the medicine had accumulated to a poisonous extent in the stomach, and had then been absorbed. This is a point to which attention is not usually directed, and it is an important one.

When the disease occurs at the cardiac orifice of the stomach the symptoms greatly resemble those of œsophageal obstruction ; there is difficulty in swallowing, and the food tends to be retained in the gullet, whence it may be returned to the mouth in small quantities by a process of regurgitation.

In other cases of malignant disease of the stomach the new growth is not confined to the orifices of the organ ; not infrequently the whole of the gastric wall in the neighbourhood of the lesser curvature is the seat of the malignant infiltration ; and in other cases the disease may affect the stomach throughout its whole extent. Under such circumstances the thickness of the stomach wall may be greatly increased ; it may be as much as half an inch or an inch thick. When widely spread the new growth not seldom ulcerates, and then death may ensue from violent hæmatemesis due to the perforation of a vessel by the destructive process.

An early symptom of cancer of the stomach is loss of appetite. In the course of the malady fever is sometimes present; this is most probably due to septic absorption from the ulcerated gastric surface.

We have seen a case in which pyæmic symptoms arose from the presence of a collection of pus between the duodenum and lower surface of the liver, due to the perforation of the gastric wall in consequence of malignant ulceration.

The remaining symptoms of cancer of the stomach are those which are met with in other chronic diseases of the organ: pain, especially after food, flatulence, constipation or irregularity of the bowels, and vomiting. It is scarcely necessary to say that in most cases marked wasting is a prominent feature of the disease. Yet in some persons a fictitious appearance of health and stoutness is presented till a late period of the malady.

When the new growth affects the stomach wall, but not specially the two orifices, the symptoms are those already mentioned, viz., pain, hæmorrhage, and vomiting, but no symptoms occur which would suggest implication of either the cardiac or pyloric orifice. When the disease has involved the whole stomach, a tumour can nearly always be felt on palpation of the abdomen, situated somewhat to the left of the epigastrium.

In all forms of the malady secondary deposits in different organs are liable to arise, and, as already stated, the liver is most often affected in this manner; the lymphatic glands in the vicinity, too, are invariably involved, and in some cases the growth attacks the peritoneum, with consequent appearance of ascites.

It is a curious fact that in many cases of this disease there is a great diminution or total defect of free hydrochloric acid in the gastric juice. This peculiarity is not, however, characteristic of gastric carcinoma, for it occurs in other conditions, such as those associated with renal disease and fevers.

In this malady, leucocytosis and poikilocytosis may

both be present, but it is said that the increased production of leucocytes, which usually takes place after meals, does not occur. The malady is inevitably fatal; in some cases a severe hæmorrhage from the diseased surface carries off the patient; in others, perforation occurs, though this is not a frequent accident, inasmuch as adhesions tend to form with the neighbouring organs; and many cases die from exhaustion. In any event, the fatal result is seldom postponed for longer than a year and a half from the commencement, and many cases die within a much shorter period.

The cause of this disease is extremely obscure, but there appears to be no doubt that the tendency to gastric carcinoma may be hereditary. It is a disease of the middle and advanced periods of life.

Cancer of the stomach is often a primary lesion, and in this form is especially apt to attack the pylorus. On the other hand, it may be secondary to malignant disease of the pancreas, or of the liver. Some cases have been thought to be caused by a blow or other injury over the situation of the stomach; in all probability the occurrence would be merely fortuitous, and might cause attention to be called to a tumour already existing. Much has been said of late years on the parasitic origin of cancer. The facts connected with malignant disease of the stomach do not tend to throw any further light on this view of the question, and it must be admitted that as regards this and other forms of carcinoma we are absolutely ignorant as to its causation.

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The malignant process arises in connection with an overgrowth of the epithelial cells, normally lining the gastric glands. This epithelial proliferation invades the surrounding elements of the tissues, and transgresses its normal boundaries; each stratum of the gastric wall is successively invaded, first the sub-mucosa, then the muscular layer, and finally the serous membrane itself.

The histological appearance of the growth may vary considerably; in pyloric carcinoma, through the marked

production of connective tissue growth, the scirrhus form is usually met with. All intermediate grades, extending to the soft, rapidly-growing form of cancer, may be observed. In some cases the new growth has the appearance of epithelioma; in others, of colloid cancer. It is the softer and more vascular kinds which give origin to profuse hæmorrhage. The growths secondary to carcinoma of the stomach are soft, and increase with great rapidity, as a rule. It must be borne in mind that cancer of the stomach may originate in the edges or floor of simple ulcer of the organ.

Treatment.

From the medical point of view, this is purely palliative. The disease is in its nature fatal, and all that can be done is to support the strength of the patient by a judicious dietary, and to relieve his sufferings by the administration of anodyne drugs. Some writers speak well of the effects of iodide of potash, others of methyl blue; it is very doubtful if treatment of this kind is of any, even merely temporary, advantage. Opium, belladonna, and chloral may all be required for the relief of pain.

The medical treatment of this disease being so unsatisfactory, a few words must be added on the surgical aspect of the question. Of late years there has been a decided tendency to resort to surgical measures for the treatment of cancer of the stomach, and in some few cases good results have been obtained. Two operations have been resorted to, the choice being determined by the position of the new growth. When, through malignant disease of the cardiac end of the organ, great difficulty is experienced in getting food into the stomach, the latter has been opened, and the patient fed directly through the artificial orifice. To this operation the term *gastrostomy* is applied. If the pylorus is obstructed so that the contents of the stomach cannot be passed onwards, complete excision of the diseased structure has been effected.

In other cases, surgical interference has been limited to making a communication between the stomach and some

portion of the intestine; in other words, *gastro-enterostomy* has been undertaken. When it is borne in mind that all these operations are very serious in themselves, and that they are performed upon patients worn out more or less with a fatal disease, it is scarcely necessary to say that the results are frequently far from encouraging.

DIARRHŒA, SIMPLE AND INFLAMMATORY

Simple Diarrhœa,

or the too frequent passage of the more or less unhealthy contents of the intestine, may be due to a great variety of causes. It is very common, indeed, in infants and young children, especially in the summer and autumn, and in them is often due to the gross ignorance and carelessness of the mother, or of those in charge of the child. Errors in diet, however, are at all ages a prolific cause of the malady, and exposure to chill is also another important factor in exciting this form of diarrhœa.

Symptoms.

The symptoms consist in a tendency to a too frequent action of the bowels, accompanied with colicky pain in the abdomen, and with alteration in the consistence and aspect of the matters passed from the rectum. The latter are loose, often frothy and irritating; but contain neither blood nor mucus. Nausea and vomiting may be complained of, the tongue may be coated and the appetite lost, but the general health is not greatly affected, and with the cessation of the diarrhœa the patient is practically well.

Simple diarrhœa is not of long duration; very often, when properly treated, an attack terminates in a few hours. When this is not the case, the symptoms persisting, and becoming more marked, there is room to fear that a graver form of the malady—inflammatory diarrhœa—has supervened.

Cases of simple diarrhœa always recover, so that it is not possible to say anything as to the morbid appearances. These, in all probability, consist in slight catarrhal changes, which are rapidly recovered from.

Diarrhœa, Simple and Inflammatory

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The most important points to be attended to in the Treatment. treatment of this form of diarrhœa are to give the patient rest, and to strictly regulate the diet. Repose in the horizontal position is desirable, and severe cases should be strictly confined to bed. Warmth to the abdomen and extremities is important. No solid food should be taken, but milk alone must be administered. It may be diluted with water, barley water, seltzer water, or lime water, and should be given cold. Care should be taken to avoid overloading the stomach; small quantities of milk only should be administered at one time. Should there be nausea or sickness, small pieces of ice may be sucked.

As regards drugs, when evidence exists of dietetic error, and of the presence of decomposing matters in the intestinal canal, the administration of a purgative is desirable. Castor oil often acts well, and may be advantageously combined with tincture of opium in cases characterised by colicky pain. No drug is more generally useful than bismuth in cases of simple diarrhœa, and when combined with an alkali, with aromatic spirits of ammonia, and with some preparation of opium, it will often act in the most satisfactory manner.

Inflammatory Diarrhœa

In this form of the malady the symptoms are much more severe than in the affection just described. It may be met with at any age, and is a very common disease in infants and young children. It may commence as a simple diarrhœa, which, either through neglect or improper treatment, has passed into the more severe form of the malady; or it may present the characters peculiar to itself from the outset. The causes of inflammatory diarrhœa are bad feeding, chill, and general neglect.

The symptoms of the malady usually begin abruptly with Symptoms. abdominal pain and griping, accompanied with the passage of fæcal matters, which are mingled with mucus and

blood. The act of defecation is attended with and followed by much tenesmus. Blood, when present, is usually in small quantity only, and often occurs in the form of streaks.

This malady, which is especially common in childhood, does not at first cause much disturbance of the general health, and the child may make little or no complaint beyond that of abdominal pain; the appetite, too, remains fair. Only too often, however, through neglect or through unsuitable treatment, other and more serious symptoms do not fail to appear. The temperature, previously normal, may rise to 102° or higher; obstinate vomiting sets in, nothing being retained in the stomach; the diarrhœa is more urgent, and alters in character, the evacuations becoming very offensive, containing increased quantities of blood, and in some cases shreds of mucous membrane, the whole resembling dirty water; and unless appropriate treatment be energetically carried out, the patient may die collapsed and comatose. All gradations of severity are encountered between the comparatively mild form of the malady first described and the severe and fatal type of the disease, which is only too frequently seen in the out-patient room and wards of the hospitals of large cities in the person chiefly of babies and young children.

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When death occurs in this form of diarrhœa the mucous membrane of the large intestine is found to be inflamed; it is thickened, congested, and covered with excess of mucus. Not seldom ulceration is present; the ulcers may be one or two only, or may cover to a greater or less extent the whole mucous surface.

The small intestine is usually the seat of catarrh, and ulcers may also be met with in this portion of the bowel.

In very severe cases destruction of the mucous membrane of the large intestine may be much more extensive, large areas being denuded of their mucous investment, and the intestinal contents may consist of the shreddy detritus thus produced, mingled with blood and mucus in large proportions.

Rest in bed, warmth to the surface, and a fluid diet are Treatment. essential in the treatment of this form of diarrhœa. Constant vomiting may be a troublesome symptom ; it may be combated by sucking ice ; or by administering effervescing draughts. Milk and soda-water should be given in small quantities and at frequent intervals. In cases in which milk cannot be retained, whey or white wine whey may be sometimes successfully administered. Stimulants are often necessary ; they are best ordered in the form of old brandy, or as white wine whey already alluded to.

Drugs are essential in the treatment of this form of diarrhœa, and of all remedies opium is the most generally useful. In combination with bismuth, alkalies, and catechu it often has a most salutary effect.

In the inflammatory diarrhœa of infants and young children, nothing is better than five or ten drops of castor oil, with a minute dose of tincture of opium ($\frac{1}{4}$, $\frac{1}{2}$, or 1 min., according to age), together with syrup and mucilage in cinnamon water. When a case of inflammatory diarrhœa is seen early, and this treatment, with suitable dieting, adopted, recovery almost invariably ensues.

In all cases, both in adults and children, the diet must be most carefully regulated for some time after the cessation of the diarrhœa.

CHOLERAIC DIARRHŒA

THIS is a form of diarrhœa very prevalent in London and other large cities in hot weather, affecting chiefly, but not exclusively, young children and infants.

Symptoms.

The symptoms are most urgent and severe. The attack commences suddenly, with violent pain in the abdomen, purging, and intractable vomiting. The latter symptom is often so severe that nothing is retained, entrance of food into the stomach being followed by its instant rejection.

There is in this malady a tendency, very strongly marked, to collapse, and in the course of an hour, or less, the patient may be in a condition of the greatest peril. The extremities become cold and blue, the temperature falls to the normal, if previously raised, or may even become sub-normal, the features are shrunk, drawn, and pinched, with dark circles round the eyes. In young infants the fontanelle becomes greatly depressed, a very significant and very unfavourable sign, and one that should invariably be looked for.

The vomiting continues to be rebellious to all treatment; the motions are fluid, resembling dirty water, are often very offensive, and are passed from the bowels with extreme frequency. In a very large proportion of cases death ensues within a few hours of the onset of the attack. The fatal event may be preceded by convulsions.

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It will be noticed that the symptoms of this malady are of extreme urgency. Yet on post-mortem examination there is a singular absence of morbid appearances. These are generally limited to a pallor and thinness of the mucous membrane of the small and large intestine,

together with undue prominence of Peyer's patches and of the solitary glands. Ulceration is in our experience usually entirely absent; at the most, some small superficial ulcers of the ileum and large intestine may be found. The mesenteric glands are often considerably enlarged, in some cases extremely so.

Some cases of this deadly malady are less violent, being characterised chiefly by the persistence and intractability of the vomiting, but abdominal pain being a less prominent symptom. This form of the malady may be prolonged for a week, ten days, or even for a fortnight; but it almost invariably terminates fatally from exhaustion, the child being worn out with the constant vomiting and diarrhœa.

The morbid appearances differ in no respect from those just enumerated as appertaining to the more severe form of the malady.

In the most severe form of the affection all treatment is Treatment.
futile. In spite of the best endeavours, the child passes shortly into a state of collapse, and dies from exhaustion.

It is most important that, at the very first appearance of symptoms, active treatment be initiated. The child must be kept in bed, hot water bottles being employed to warm the extremities. It is a good plan to order a mustard poultice (diluted with linseed meal) to the epigastrium, as it sometimes controls the vomiting to a certain extent. Very small quantities of milk should be given at one time, but the administration must be frequently repeated. Very often the vomiting is so persistent that even the smallest portion of milk cannot be retained. In such cases a trial may be made of white wine whey.

When everything is persistently vomited, it is better to do nothing more than administer water and stimulants; and as regards the latter, nothing is better than brandy of good quality, of which 15 or 20 drops may be given every quarter or half hour, or iccd champagne may be ordered. In some cases minute doses of calomel will have good effect in controlling the vomiting, but its action is somewhat uncertain.

Small doses of grey powder and of Dover's powder may also occasionally be useful. In extreme cases the injection hypodermically of 1-50th grain of morphia has given favourable results. Sometimes large doses of bismuth with tincture of opium in minute proportions is an efficacious treatment.

In the rare cases in which the malady takes a favourable course, as soon as the vomiting ceases nourishing food must be assiduously administered. At this period some of the many peptonised foods and meat peptones may be employed with advantage.

There is a form of diarrhoea similar to the above which occurs in hot weather in adults, and which is distinguished by the collapse with which it is accompanied. No hot summer passes in London without a "cholera" scare, which generally arises in the East End. The so-called "cholera" is in reality nothing else than the form of diarrhoea under discussion. With violent purging and vomiting the patient passes into a condition of collapse, which may strongly resemble that of Asiatic cholera. It is scarcely necessary to say that on bacteriological examination no comma bacillus is detected. The disease does not usually spread, and has nothing in common with cholera except the symptoms. Most cases recover with warmth, stimulants, and appropriate drug treatment; but some die.

CONSTIPATION

CONSTIPATION, or the defective discharge from the intestinal canal of its faecal contents, is an extremely common complaint.

The term must be strictly confined to cases in which organic disease is absent ; when defective elimination is due to the latter, the case is no longer one of simple constipation, and obviously the condition will persist until the structural lesion is relieved or removed. For this reason cases of fissure of the anus, and other surgical affections of the same locality in which one of the most prominent features is chronic costiveness, are not included under the head of constipation in the sense in which the term is here used.

The one symptom is that the bowels do not act regularly or sufficiently often. If the regularity of the bowels be still maintained, it will be found that the discharge of faecal matter is insufficient. There is some degree of faecal retention. As the result of this sluggish action of the bowels dyspeptic symptoms may arise ; distension after food, flatulence, acidity, palpitation, headache, and numerous other complaints may be the result. In chronic cases the complexion becomes muddy, and sometimes there is a yellowish tinge of conjunctiva and skin. The tongue is furred, the breath offensive, and the appetite bad. Symptoms.

As a rule, the evil effects of constipation are at this period more or less annulled by appropriate treatment, and the malady is not therefore one that endangers life. But it cannot be said in all cases that constipation does not lead to serious, or even fatal, results. We have met with more than one case in which death resulted simply

and solely from neglect of the regular action of the bowels. One of these was in the person of a young woman who had always been more or less constipated, and in whom the symptoms of obstruction, including fæcal vomiting, had set in. The abdomen was enormously distended, encroaching on the limits of the thorax, and displacing the heart a long distance upwards. Death ensued suddenly, probably from syncope, caused by the interference with the heart's action, the result of its displacement. Post-mortem examination revealed enormous distension of the ascending and transverse colon, the result of fæcal impaction in the sigmoid flexure and rectum. A condition such as this is fortunately very rarely met with, but it is important to remember that such serious results of chronic constipation are to a certain extent potential in every well-marked case of the malady.

If the urine of a chronically constipated person be boiled with hydrochloric acid, much darkening of the fluid will generally ensue. This reaction is often most marked in the case of young women, anæmic and otherwise, who are notoriously negligent of the action of the bowels, and in whom it is quite usual to be told that fæcal evacuation takes place once a week, once in ten days, or even once in a fortnight. The coloration is supposed to depend upon the presence in undue quantity in the urine of indol and skatol, products absorbed from the intestine, where they arise in connection with the detention of fæcal matters, and as a result of retrograde changes in the same.

In conclusion, it must not be forgotten that great differences exist in different people with regard to the period ensuing between successive actions of the bowels, and this within the limits of perfect health. As a rule, evacuation occurs once in twenty-four hours, but such regularity is by no means invariable. Two days, or even a longer interval, may in some people elapse between successive actions, and yet the general health may not suffer in any way.

Causation.

The causes of constipation are very numerous; it may

be due to external or to internal influences. Amongst the former are want of regularity in soliciting the action of the bowels. There is no doubt that it is possible to so train the intestines that defecation shall always take place at the same hour of the day. Neglect of regularity in this respect accounts for many cases of constipation. Unsuitable food is a most usual provocative of this trouble, and a deficient quantity of water taken by the mouth is also a very common cause of dryness of fæces, and therefore of constipation. Too much animal and too little vegetable food account for many cases. The pernicious habit of drugging with quack pills and other trash is, again, a prolific cause of the malady. Habits of life, deficient exercise, and laziness generally all have a great influence in exciting the affection.

Among the internal causes of constipation, deficient mastication of food owing to defective teeth is frequently met with. Blood conditions, such as that present in anæmia, appear to have a great influence in exciting constipation, and a weak and imperfect action of the muscular coat of the intestine explains many cases of the malady.

As regards the morbid anatomy of constipation, it cannot be said that any characteristic morbid appearances exist. In very chronic cases there may be some distension of the colon, due to the obstruction of scybala in the sigmoid flexure and rectum; in such the mucous membrane may be more or less catarrhal, or even slightly excoriated.

From what has been said above, it is obvious that the Treatment. successful treatment of constipation can be conducted only on the principle of careful inquiry into the habits and manner of life of the patient. Regularity in soliciting an action of the bowels must be insisted on, proper and suitable exercise must be taken, and of all kinds of exercise riding on horseback is the best. Tepid or cold

bathing may be indicated, and slothful habits, such as late rising, must not be permitted.

The greatest care must be taken in regulating the diet, and a sufficiency of vegetable food and of water must be insisted on. The simple expedient of drinking a glass of tepid water on rising in the morning may be of considerable effect. Oatmeal porridge at breakfast is often taken with advantage. In all cases the state of the teeth must be investigated, and, if found to be defective, must be remedied.

The drug treatment of constipation occupies an entirely subordinate position in comparison with the measures above indicated. The constant taking of aperient medicines is the very worst method of treating the affection. An occasional aloetic pill at night, followed by a draught of some natural mineral water, such as Hunyadi Janos or *Æsculap*, taken warm before breakfast, may have a beneficial effect; but the continual taking of purgative medicines does nothing but harm. Sometimes enemata are requisite, and in some cases systematic treatment at some foreign spa, or at Leamington or Cheltenham, may speedily effect a cure.

In advanced age constipation is often a troublesome affection, and it may sometimes be necessary to break up fæcal masses, either by mechanical means or by the action of enemata applied high up in the bowel by means of the long tube. Cases of this description, due doubtless to atony of the bowel, the result of old age, may present very serious and alarming symptoms, which speedily terminate fatally, unless relief be given.

INTESTINAL OBSTRUCTION

THIS condition is often diagnosed when it does not exist, and when the symptoms are due to affections differing widely from those which give rise to obstruction of the bowels. Over and over again we have seen instances of acute peritonitis diagnosed as being cases of obstruction, simply and solely on account of the constipation and vomiting which so often accompany this acute inflammatory lesion. This mistake is very often made in cases of the fulminating form of appendicitis, in which, through the rupture of an ulcer, acute general peritonitis results. It is needless to say that such mistakes may lead to very disastrous consequences, as the diagnosis of obstruction will probably prompt the administration of severe purgatives and the postponement of operation until too late, both of which are contingencies greatly to be deprecated.

Genuine obstruction of the bowels, except when arising in connection with malignant disease, is of much more rare occurrence than is generally supposed. It may be due to a volvulus, or twisting of the gut upon its own axis or upon its mesenteric attachment; to internal strangulation by a portion of bowel passing through a hole in the mesentery, for example, or by its constriction from a band; to intussusception, or slipping of one portion of the bowel into a portion immediately below it; or to the impaction of a foreign body, such as a gall stone or of some substance which has been swallowed. In all these cases the symptoms of obstruction are more or less acute.

Chronic obstruction of the bowels is generally due to narrowing of the calibre of some portion of the gut by a

new growth, which is nearly always malignant. Non-malignant, or simple, narrowing of the intestine is exceedingly rare, but cases are recorded in which syphilis has given rise to the development of a slowly contracting stricture of the bowel. In some few instances chronic constipation has caused symptoms of intestinal obstruction, which may even have led to a fatal termination. A case of this description, which ended fatally, is referred to in the article devoted to the consideration of constipation. Chronic obstruction of the bowels may also be caused by pressure of tumours, themselves unconnected with the alimentary tract.

Symptoms.

The symptoms of acute obstruction commence suddenly, and in the course of a few hours a patient may be brought to the brink of the grave from a condition of apparently robust health. Violent pain in the abdomen, which is often very tender on pressure, vomiting, a rapid, small, thready pulse may all appear at the outset of the illness. The expression of the face is anxious, and the features drawn and pinched. As a rule, there is complete and most obstinate constipation, but at the outset an action of the bowels may occur.

The urine in the acute form of obstruction is often much diminished in quantity, the reduction being greater the higher the obstruction occurs, on account of the increased urgency of the vomiting, and also because of the diminished surface of intestinal mucous membrane which is available for absorption. Great thirst is often complained of. The different forms of acute obstruction present features more or less characteristic of the particular morbid process which is the cause of the symptoms. Intussusception is usually confined to young children, and is known by the occurrence of pain in the abdomen, with distension of the same, and often by the presence of a sausage-shaped tumour; by the passage of blood from the anus; and by the presence of the prolapsed gut in the sigmoid flexure or rectum, where it can be frequently felt by the examining finger. Vomiting and

constipation accompany these symptoms. Care must be taken not to mistake for intussusception a condition due to enteritis, in which, along with pain and distension of the abdomen, mucus and blood are passed per rectum. The absence of a tumour in the abdomen, and of anything in the nature of a mass on rectal examination, will enable a correct diagnosis to be made. But we have seen cases in which considerable care was necessary in order to discriminate between the two conditions.

In the case of volvulus, internal strangulation due to a band or otherwise, or the impaction of a foreign body, the patient may, as already said, pass from a condition of perfect health into one of dangerous collapse in the course of a few hours, with vomiting, constipation, and violent pain in the belly. In such cases the abdomen becomes tense and extremely painful on pressure, and tympanitic on percussion. In some cases struggling intestine may be detected both by the eye and by the hand if the latter is placed on the abdominal wall. The pulse is rapid and feeble, the expression anxious and drawn, and if relief is not given, the vomiting may become a continuous passive outpouring of stercoraceous matter, death speedily closing the scene.

If a gall stone be impacted, the symptoms may be very urgent; such cases are, however, rare, and the only guidance as to the nature of the obstacle would be the history of previous attacks of hepatic colic.

The symptoms of chronic obstruction of the bowels are of much more gradual, even insidious, onset, and are far less severe. In malignant disease, nearly always confined to the large intestine, the symptoms of stricture develop slowly. The motions become altered in size and shape, being frequently smaller than natural, and flattened instead of circular in outline; or they are occasionally loose, and may contain mucus and blood. More and more difficulty is experienced in getting the bowels to act, and fæcal matters accumulate in the dilated bowel immediately above

the seat of constriction. A tumour, due to the development of the cancerous growth in the wall of the gut, is usually perceptible. Sickness commences and is very obstinate, finally becoming faecal, and the death of the patient ensues unless a timely colotomy be performed.

Much the same symptoms are met with in other forms of chronic obstruction, with the exception that no solid permanent tumour, such as that met with in malignant disease, is present. On the other hand, the movements of the struggling bowel above the seat of structure may be clearly perceptible both to eye and hand.

As already mentioned, the prognosis in acute obstruction is extremely serious. In the case of intussusception, if spontaneous resolution does not ensue, or if the obstruction is not relieved by art, gangrene occurs through the hindrance to the circulation in the affected portion of the intestine. In some cases the slough has been discharged per anum. In the case of internal strangulation and volvulus, gangrene may also occur, or the affected portion of the intestine may rupture, with consequent extravasation of the contents of the bowel into the peritoneal cavity. Only in very exceptional cases does recovery ensue from the spontaneous resolution of the different forms of obstruction when the case is left to nature. It is, therefore, obvious that in no class of disease is a knowledge of symptoms, signs, and morbid anatomy more essential than in that which causes obstruction of the bowels.

The acute forms of intestinal obstruction are not of common occurrence. Intussusception in children is perhaps one of the most frequent manifestations of the malady, yet this form of obstruction is but rarely met with. The chronic form of obstruction is by no means uncommon; it is nearly always due to malignant disease of the large intestine.

In making the diagnosis of intestinal obstruction, it is most important that a correct and complete history of the case be obtained, and that proper weight is given to the

various symptoms—pain, vomiting, obstinate constipation, collapse—as well as to the presence or absence of a tumour. The greatest care must be taken that acute perforative peritonitis be not mistaken for obstruction of the bowels. This matter has been already discussed, but its great importance renders it necessary to repeat the caution which has been given.

No reference has been made to obstructions arising as the result of ordinary strangulated hernia. This form of obstruction of the bowels is fully discussed in surgical works, and its diagnosis and treatment lie wholly within the province of the surgeon.

In intussusception, a portion of the intestine passes into the bowel beneath it, much in the way that the finger of a glove can be invaginated from the tip of the finger into itself. But the mesenteric attachment complicates the process, inasmuch as it tilts the bowel sideways, so that usually its lumen looks towards the wall of the external tube. It will, of course, be seen that the intussusception consists of three surfaces, namely, an internal serous and two external mucous surfaces, in addition to the peritoneal investment. It is also clear that the portion of bowel originally prolapsed will always be the lowest portion of the mass. It is obvious that a severe hindrance to the circulation of the intussuscepted portion must ensue, and it is from this congested portion that the hæmorrhage occurs. The increase in size of the intussusception is always at the expense of the outer layer, or wall. It appears that any portion of the bowel may be invaginated, but it would seem to be more common for the ileum to be prolapsed through the ileo-cæcal valve than for other portions of the gut to be the seat of this occurrence. Intussusception is much more rarely met with affecting the small intestine only. Such cases are most frequently seen in children older than those in whom the large intestine is involved in the intussusception. It is only necessary to call attention to the frequency with which numerous intussusceptions

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are met with in the post-mortem room in the bodies of patients dying from causes wholly unconnected with the diseases treated of in the present article. Such lesions are of no importance whatever, and are probably formed during the last hours of life.

In volvulus, a portion of the bowel is twisted on itself, or on its mesenteric attachment, in such a way that either end of the loop constricts the other. Obviously, therefore, great interference with the circulation through the affected portion of the gut must ensue, and gangrene and rupture are usually associated with this lesion. This form of obstruction affects the large intestine, the sigmoid flexure, and the cæcum.

When strangulation occurs, through a portion of intestine getting nipped in a hole of the mesentery, or by the pressure of a band, the condition differs in no respect from that which occurs in ordinary strangulated hernia. Bands are of various nature, and occur, in general, in connection with the ileum. They may extend from the intestine to the mesentery, or from one portion of the bowel to another. They are fibrous cords, and are occasionally due to the organisation of lymph thrown out in previous attacks of peritonitis, but their origin is often obscure. We have seen a band in a case dying from the pulmonary complications of enteric fever. It was situated just above the ileo-cæcal valve, extending in the form of a fine cord about five inches long between its attachments to the ileum. No intestine was prolapsed into it.

The other forms of intestinal obstruction require no discussion as regards their morbid anatomy, inasmuch as this is fully treated of in the articles devoted to the consideration of the affections to which they give rise.

Treatment.

The treatment of chronic obstruction due to malignant disease is surgical, and the operation of colotomy is required, for details of which reference must be made to surgical works.

In the acute forms of obstruction there can be no question

that the operation of laparotomy gives by far the best chance to the patient. The danger of the operation, though by no means slight, has been greatly diminished since the introduction of antiseptic precautions. As, too, in many cases of acute intestinal obstruction the diagnosis of the exact cause of the symptoms cannot be made with certainty, the precise condition can be ascertained, and the mechanical impediment removed, at the time of operation. It is well that an opening sufficiently large to attain both these objects should be made. The same remarks apply to the treatment of intussusception. Valuable time is lost by the method formerly adopted of inflating the intestine, and by trying to reduce the intussusception by this and other uncertain measures. It is far better to resort at once to laparotomy when the diagnosis is definitely made. In all cases of acute obstruction procrastinating methods are disastrous, and should be abandoned, for there can be no doubt that when symptoms of serious obstruction occur it is wisest to resort at once to the operation of laparotomy.

In cases in which the obstruction is partial only, or due to accumulation of faecal masses, large enemata, injected as high as possible, may be sufficient to remove the urgent symptoms. Vomiting in such cases may be treated by the sucking of small pieces of ice, but aperients should not be administered if there is the least reason to think that serious obstruction of the bowel exists.

If there is reason to think that syphilis may be the cause of the obstacle to the passage of the intestinal contents, anti-syphilitic treatment should be energetically pushed.

DYSENTERY

Symptoms. DYSENTERY is not often seen in this climate, and when it does occur, it is in those who have contracted the disease in tropical countries.

The symptoms of the affection are chills and fever ; pain, tenderness, and distension in the course of the large intestine ; colicky pains in the abdomen, with the addition of frequent and very painful diarrhoea, the evacuations being of peculiar character, and quite *sui generis*. In the *acute* disease the bowels may act ten, twelve, twenty, or more times a day, and great tenesmus accompanies the act of defecation. The motions are often practically free from faecal matter, and consist of mucus, mingled with shreds of membrane, and containing blood. They are very offensive, and may be of almost gelatinous consistence, from the abundance of mucus contained in them. In its acute form, the malady often begins suddenly with febrile symptoms, which may be slight, but are often very severe. The temperature may attain 103°, 104°, or even a higher range. The patient, in this form of dysentery, complains much of thirst, and there is rapid loss of flesh. In severe cases typhoid symptoms supervene, with delirium, dry tongue, and extreme prostration, death soon terminating the case ; in some, death occurs from bronchitis or pneumonia.

Acute dysentery may last many weeks, not infrequently two or three months may elapse before the symptoms subside ; there is a great tendency to relapse, and to the supervention of a chronic form of the malady.

Acute dysentery is a very dangerous disease, and in the most severe cases death may ensue in the course of a few

days. In mild attacks, after the persistence of slight febrile symptoms and diarrhœa for a few days, convalescence sets in, the temperature becomes normal, the evacuations again present a fæcal appearance, and become free from blood, and the patient regains a certain measure of strength. But recovery is long and tedious, much debility remaining, it may be for weeks or months, and the symptoms are extremely likely to recur on any slight provocation.

The disease is not infrequently complicated by the presence of a hepatic abscess, or of abscess both of liver and lung; further, perforation of the bowel may take place, with consequent peritonitis. The disease may be complicated, in some cases, with malarial fever.

The majority of cases seen in this country are those of the *chronic* disease, and then the condition of the patient varies, now better, now worse, but never entirely free from symptoms. Any indiscretion in diet, or exposure to cold, always aggravates the complaint.

It is of the greatest importance for the student to be aware of the fact that cancer of the rectum gives rise to symptoms which by the patient are often attributed to "dysentery," or "dysenteric diarrhœa." The mistake arises from the intractability of the diarrhœa, and from the appearance of the dejections, due to the mucus and blood contained therein. It cannot be too strongly urged that, whenever such symptoms are complained of, a rectal examination should be made forthwith. In the very large majority of cases, it will be found that malignant disease of the rectum is present.

Further, a rectal examination should not be dispensed with even in cases where, on account of their youth, malignant disease may appear to be excluded. Malignant disease of the rectum is met with sometimes in quite young people; we have seen it in a boy of twelve.

If hepatic abscess is present, it will present the symptoms which are characteristic of that complication.

There is no doubt that the chief cause of the disease is the drinking of impure water. Whether in this way a definite organism is introduced into the alimentary canal is another question; there is much reason, however, to believe that this is the case, and that the disease is, like so many others, of specific origin. An organism, the *amœba coli*, has been isolated and cultivated. This protozoon resembles other amœbæ in its constitution, and in the habit of protruding and withdrawing pseudopodia. It often contains blood cells, bacteria, and foreign bodies, and may become encysted when imperfectly supplied with nourishment. It is found in the large intestine, and in the evacuations of those suffering from tropical or sub-tropical dysentery. But it appears also occasionally to be present in the intestines of healthy people. To describe it as being the cause of the disease is certainly premature. Insanitary conditions generally are powerful exciting causes of dysentery: bad air, bad food, and marshy, malarial surroundings.

Dysentery is essentially an ulcerative colitis. In its mildest forms nothing more may be noticed than swelling, redness, and catarrh of the mucous membrane of the large intestine, with perhaps the presence of minute superficial ulcers of its surface. In the severe forms of the malady, ulceration of the mucous membrane is the marked feature of the disease. Areas of the mucous surface of the large bowel are denuded of their epithelial covering, and in the most severe cases deep, ragged ulcers are found, due to the destruction, not merely of the superficial layers, but of the muscular coat of the gut also. In the most severe form all the coverings may be destroyed down to the peritoneal investment of the bowel, and perforation may ensue. The mucous surface is covered with shreds of necrotic tissue, and in the so-called "diphtheritic" form of the malady a fibrinous deposit, or "false membrane," may not merely cover the internal surface, but may also extend through the thickness of the intestinal wall. In such cases the

mucous surface presents a greyish or whitish appearance, interspersed with darker patches formed by small portions of dead tissue. In the most severe type of the disease the intestinal wall may be found to be practically gangrenous.

In the chronic variety of dysentery there is much tendency to thickening of the wall of the intestine, with the addition of chronic ulceration and catarrh of the mucous membrane, which is covered by the slimy gelatinous matter forming a portion of the characteristic discharge, the latter being often blood-stained. Shreds of epithelium and dead tissue are also present.

When abscess of the liver, or of the lung, peritonitis, or perihepatitis complicate the disease, the appearances are those of the same lesions occurring independently of dysentery.

The margin of the ulcers in this disease may be round or oval, but they are more often quite irregular in outline; the edges are, as it were, loose and undermined, so that the destructive process may be really far more extensive than is at first apparent, through its ravages being concealed to a greater or lesser extent by the thin, loose edge of the ulcer which floats out in water. The ulcers may occupy limited areas of the mucous membrane of the large intestine, or may extend throughout its length.

In severe cases the morbid process may not remain limited to the colon, but may also occur in the ileum. Not infrequently the two processes, ulcerative destruction and cicatricial thickening, are in progress at the same time. Abscess of the liver, already referred to, is by no means an uncommon complication of this disease, and is probably due to absorption, from the ulcerated surface, of infective products containing pus-forming organisms, which are carried through the vena portæ to the liver.

In all severe cases of dysentery, rest in bed in a large, well-ventilated room is of the first importance. The diet should consist of milk and beef-tea, and stimulants will often be required. Ipecacuanha has for long been regarded

Treatment.

as a specific in this disease, and is given in large doses, the patient having previously taken a dose of opium. In this way 20 or 30 grains of ipecacuanha can be taken. If vomiting ensue, the dose may be repeated. Purgatives should be avoided in this disease. Pain must be alleviated by the use of opium or by the hypodermic injection of morphia.

Of late years more attention has been devoted to the direct treatment of the affected bowel by means of astringents. Large injections containing nitrate of silver, or other drugs of similar action, have been employed, with a view of subjecting the diseased mucous membrane to the action of these remedies. It is not always easy to carry out this treatment, and very frequently the results are by no means satisfactory. This mode of treatment is chiefly applicable to the more chronic forms of the disease.

In the case of those who have returned to this country from the tropics suffering from chronic dysentery, good results generally ensue from careful dieting, rest in bed, and the employment of a powder consisting of equal parts of Dover's powder and powdered ipecacuanha in suitable doses, and at appropriate intervals. But relapses are almost certain to occur under any mode of treatment.

CANCER OF THE INTESTINE

MALIGNANT disease of the intestine may occur in any part of the alimentary tract below the stomach. It is, however, very rarely met with in the small intestine as a primary growth. In the large intestine, on the other hand, primary cancer is by no means uncommon, and in this locality by far the larger majority of cases show the disease to be situated to the left of the median line of the body. The descending colon, the sigmoid flexure, and the rectum, these are, *par excellence*, the seat of primary cancer when affecting the large intestine. Probably the rectum is the most likely to be involved; then in the order of probable implication comes the junction of the transverse and descending colon, and lastly the sigmoid flexure. Cancerous disease of the cæcum occurs with far less frequency than in any of the situations just alluded to.

The disease steals on insidiously, and is probably far advanced before the patient seeks medical advice. Early symptoms are slight diarrhœa alternating with constipation, and pain in the abdomen may be complained of; at first it is probably slight and fugitive. Loss of appetite and weakness ensue, and the patient begins to lose weight. Physical examination at this period will probably reveal the presence of a mass in the abdominal cavity. The discovery of a lump in this locality is a point of very great importance, and careful examination should invariably be made for its presence. The position of this mass will, of course, vary according to the portion of intestine affected. It is usually very hard, rough on the surface, and at first may be freely movable. As time elapses, however,

Symptoms.

adhesions tend to fix the mass to neighbouring structures. Repeated examination will often reveal the fact that the malignant mass is rapidly growing.

As in all cases in which obstruction occurs in the intestinal tract, the portion of bowel above the stricture dilates, and may become greatly distended; exaggerated peristalsis may be observed in the portion of the intestine immediately above the malignant mass. A tympanitic condition results, and the consequent flatulence and hindrance to the descent of the diaphragm may greatly add to the sufferings of the patient. Increasing difficulty in the passage of motions is complained of, and these present a very abnormal appearance. They may be greatly diminished in size and flattened; not unfrequently the healthy type is entirely lost, and the evacuations are always loose and fragmentary. Blood frequently accompanies the dejections, and the presence of muco-pus leads to their being very offensive.

All this time the emaciation of the patient is becoming more marked; his face assumes an "abdominal" aspect, with deeply-marked lines around the nose and mouth, and his complexion, too, gets sallow and earthy: symptoms of obstruction of the bowel become prominent, viz., obstinate constipation, pain and vomiting. Should complete obstruction ensue, fæcal vomiting and the other signs of this condition may supervene. The growth may perforate the intestinal wall, and death may then ensue from peritonitis. In some cases the new growth, especially when affecting the lower bowel, perforates the vagina or bladder, and exceptionally the accumulation of fæces on the proximal side of the obstacle may be so great as to cause rupture of the gut, in which case, of course, fatal peritonitis immediately ensues. In by far the larger number of cases death terminates the sufferings of the patient long before total obstruction supervenes; or the operation of colotomy has been performed, by which the danger of complete obstruction is obviated.

In cancer of the rectum the chief symptom is diarrhœa;

only at a later stage do muco-purulent discharge and blood appear in the motions. It is of the utmost importance for the student to be thoroughly familiar with this fact. It is quite common for cancer of the rectum to be overlooked, and for the case to be treated as one of obstinate diarrhoea. It is unnecessary to say that all treatment of this description is perfectly futile; and, in addition, the disastrous result follows that the disease is no longer amenable to operative treatment through the lapse of time. There is only one means of avoiding such mistakes: to make a digital examination of the rectum in every case of diarrhoea which is chronic, and does not respond to treatment. Neither must this examination be neglected on account of the youth of the patient. Cancer of the rectum is by no means infrequent in quite young people. Under no circumstances should the diagnosis of "chronic dysentery" be made. Every case of "chronic dysentery," except in those who have really contracted the disease in the tropics, which has come under our observation has proved to be rectal cancer.

The possibility of secondary deposits in malignant disease of the bowel is great. The liver is perhaps the organ most frequently affected in this way, and should the secondary growth be situated in the transverse fissure, jaundice may develop, and persist in a very intense form. The peritoneum may likewise be the seat of secondary malignant deposit; and the great omentum, when thus involved, may be recognisable as a hard, transversely-situated ridge in the upper portion of the abdominal cavity. The lung or pleura may also be the seat of secondary malignant infection.

Pain is a very uncertain symptom in this malady. It may sometimes be acute and persistent; more often pain is not a prominent feature, and it may be entirely absent from first to last.

With the exception of cancer of the rectum, which may occur practically at any age after extreme youth, malignant

disease of the intestine is a malady of middle and advanced life. The liability to it steadily increases with increasing years, and males appear to be more subject to the disease than females.

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Beyond that of hereditary tendency to cancer, no other influence can be traced. It is a disease which appears to arise insidiously, and, apart from a general tendency to cancerous degeneration, it is impossible to say that any particular conditions of life lead to the development of the malady. Most forms of malignant disease of the bowel assume the scirrhus type, the nodules of new growth being hard and resisting. But in some cases they are soft, presenting the appearance of encephaloid cancer. Very often the type is that of glandular carcinoma, developing in excessive proliferation of the epithelium lining the glands of the intestine, and successively invading the different structures composing the intestinal wall, precisely as happens in carcinoma of the stomach. In many cases the new growth, in consequence of imperfect vascular supply, tends to break down and form deep ulcers, with the detachment of necrotic tissue in the form of offensive sloughs.

In those cases in which death ensues from exhaustion early in the disease no ulceration may be present, but merely narrowing of the lumen of the bowel from the infiltration and thickening of its wall. In all cases the neighbouring lymphatic glands will be found to be infected, and therefore enlarged and hard. When affecting the rectum, the growth may be purely epitheliomatous, or may show transitional stages between adenoma and carcinoma, the so-called adeno-carcinoma. Secondary growths may be present in the liver and other organs.

Treatment.

The disease is essentially a fatal one. Life may be prolonged, however, by the early performance of the operation of opening the colon above the seat of disease, and thus preventing total obstruction. This operation is known as that of *colotomy*, and should always be resorted

to, as, although not in itself anything more than palliative, life is prolonged by it, and the sufferings of the patient greatly alleviated. Description of the procedure must be sought in surgical works.

No drug treatment is of the least use. Every effort should be made to maintain the strength of the patient by diet and nursing.

Of late years it has become somewhat usual to treat cancer of the rectum by a radical operation: that, namely, of entire removal. It is scarcely necessary to say that for any hope of success the operation must be performed at an early period, and before secondary infection of the lymphatic glands has supervened. In many cases less drastic procedure is advisable, and often the early performance of colotomy is attended with far better results.

TYPHLITIS, PERI-TYPHLITIS, OR APPENDICITIS

PERI-TYPHLITIS is the term applied to inflammation of the connective tissue surrounding the cæcum, of the cæcum itself, and of the peritoneum covering it. The term may also be extended to the result of inflammation of the appendix (often called appendicitis). Indeed, there can be no doubt that in the majority of cases of peri-typhlitis it is the appendix, and the appendix alone, which is at fault.

There are two great types in the symptomatology of disease of the appendix. The first is characterised by the presence of those symptoms and signs which make up the clinical picture of peri-typhlitis. In the second type the symptoms are those of acute peritonitis.

Symptoms.

The symptoms of peri-typhlitis are slight febrile disturbance, pain and tenderness in the right iliac region, together with constipation. When the abdomen is examined, it is found that a well-defined mass of considerable size occupies the right iliac region, often extending up to the right hypochondrium; this mass is dull on percussion, and often very tender on pressure. In favourable cases, and when properly treated, in a week or fortnight the mass has nearly disappeared, the temperature falls, the bowels become regular, and all goes on as before. There is, however, a great and abiding tendency for the illness to recur, especially if dietetic errors are committed.

But in some cases the course of the disease is not so simple. The temperature remains high, the pain becomes more acute, the skin over the swelling reddens, and suppuration occurs. When this is the case the abscess generally points externally, and discharge of most offensive

pus of faecal odour ensues. On the other hand, the abscess may rupture into the peritoneal cavity, or it may burrow into the retro-peritoneal tissue and descend into the thigh, simulating psoas abscess. Again, the collection of pus may be discharged into the bowel or bladder.

It is scarcely necessary to say that those cases in which suppuration occurs are far less favourable than those in which it is absent; in too many cases of suppurative peri-typhlitis fistulae develop, and the patient's condition becomes more and more serious from the repeated formation of abscesses; unless radical surgical treatment be adopted, death is almost certain from exhaustion and lardaceous disease.

In the second great type of the disease of the appendix the patient generally appears to be in his usual health, when he is suddenly seized with violent, indeed agonising, pain in the abdomen. The pain may be chiefly in the right iliac region, more usually it is general. He cannot bear the slightest touch on the surface of the belly, he suffers from great distension of the abdominal cavity, along with obstinate constipation, and possibly vomiting. The expression of the features, and the running, thready nature of the radial pulse, are also indicative of acute general peritonitis. If nothing be done, in the course of twenty-four or thirty-six hours the patient dies. To these cases the term "fulminating" may very appropriately be ascribed. The transition from apparent health to a condition in which the patient lies at death's door, all in the course of a few hours, is extremely striking. Too often cases such as these are diagnosed as "obstruction of the bowels," and then they are treated with castor oil or other aperients—a fatal error.

These, then, are the two great types of symptoms to which disease of the vermiform appendix gives rise. There may be cases in which, with strictly local disease, the symptoms of peritonitis are extremely marked; on the other hand, instances occur in which, with acute general

and even purulent peritonitis, the symptoms are more or less local. But most cases are easily referred to one or other of the two divisions just described.

As a rule, there is not much difficulty in diagnosing those cases which fall into the first group, that, namely, in which the symptoms and physical signs are local. Care must be taken in the early stage of such cases not to confound them with enteric fever. A careful consideration of the history of the case, the absence of eruption, and the result of accurate local examination will prevent any mistake occurring in the diagnosis. More care is required in differentiating between peri-typhlitis and disease of the right ovary, especially pyo-salpinx. Errors easily arise in this condition, and nothing but a careful vaginal examination will settle the question. It is only necessary to mention psoas abscess, as the risk of its being confounded with peri-typhlitis can scarcely arise if the possibility of its occurrence be borne in mind, and if a careful examination of the vertebræ be made.

In the acute, or fulminating, form of disease of the appendix, as has already been mentioned, the symptoms are too often attributed to "obstruction of the bowels." The symptoms in themselves are not characteristic; they are those of acute general peritonitis, and may arise from a great variety of causes. But there are certain points attention to which will nearly always enable a correct diagnosis to be made. For some reason, which is not at all obvious, the victims of the fulminating form of the malady are, in by far the larger proportion of cases, young males, varying in age from fifteen to twenty-five. It is often associated with a tendency to constipation, and not seldom the history will show that the illness commenced with extreme suddenness during a strain or effort, as at football or cricket. Whenever such symptoms arise in a young man, previously in good health, the possibility of the appendix being the cause of the whole mischief should never be lost sight of. It must not be forgotten that in either of its forms the disease may show

itself at all ages, and in both sexes, but in the acute variety there can be no doubt of the tendency of the fulminating type to affect youths and young men in particular.

In the very rare cases in which the walls of the cæcum are themselves inflamed, the symptoms may be those of stricture of the large intestine. Particulars of a case of this description are given under the heading of causation and morbid anatomy.

Much confusion on the subject of terminology has resulted from the loose manner in which the lesions occurring in this disease have been described. "Appendicitis" and "typhlitis," or "peri-typhlitis," have all been used as convertible terms. As a matter of fact, peri-typhlitis is, as above mentioned, an inflammation of the loose connective tissue surrounding the cæcum, and is very frequently caused by appendicitis, though it may originate in inflammation of the cæcum itself. But the effects of appendicitis are not always those represented by a peri-typhlitis. On the contrary, acute general peritonitis is by no means an infrequent result of appendicitis. This acute appendicitis may occur in a person presumably healthy, and with great suddenness; there can be no doubt at all that, in the great majority of cases, attacks of peri-typhlitis are due to perforation of the vermiform appendix by a so-called faecal calculus. No doubt the small mass, usually about the size of a pea, can remain for a long period in the appendix without harm ensuing; but, under conditions which are not very obvious, the wall of the appendix in contact with the faecal mass becomes fretted, and finally an ulcer results. This process may certainly progress without giving rise to symptoms. Sudden effort, or the mere progress of the lesion, may cause rupture of the floor of this ulcer. When this happens, the contents of the appendix and of the cæcum may escape at once into the general peritoneal cavity, or the discharge may occur locally, especially in those cases in which previous adhesions have established themselves

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between the inflamed appendix and the structures around, into the connective tissue surrounding the appendix and cæcum. In the former case acute general peritonitis results; in the latter, the condition to which the term peri-typhlitis in the strict sense is applied.

The seat of the ulcer is very often just above the insertion of the appendix into the cæcum; at other times it occurs near the apex. It may also be found anywhere between these points. It should be mentioned that foreign bodies *may* pass into the appendix and cause perforation. Far more usually, however, a fæcal calculus is the cause of the condition, and there can be no doubt that the "cherry stone" of the older writers was in most, if not all, cases a body of fæcal constitution, bearing a considerable resemblance to the object for which it was mistaken.

But cases are met with in which acute general peritonitis and peri-typhlitis are not caused by perforation of the appendix. The latter may be inflamed through retention of its contents, and perhaps by the presence of the *bacterium coli*. The contents under these circumstances may become purulent. When this is the case acute general peritonitis may arise, not from perforation, but probably from oozing of the pus through the wall of the appendix, whereby the general peritoneum becomes infected. These cases certainly occur; we have seen one quite recently, but they are much more rare than those in which the peritonitis arises from perforation of the appendix. A similar condition of the appendix may give rise to peri-typhlitis and abscess instead of acute general peritonitis.

Yet other conditions, unconnected with inflammation of the appendix, must be mentioned. Especially when the organ is unduly long, it may be bent at an acute angle, so that a kink results, or even more than one. In such cases the secretion from the mucous membrane may accumulate behind the kink, and in this way a considerable dilatation of the obstructed portions may result. In instances which have been recorded the dilatation has

ruptured, with consequent escape of its contents; these being sterile, no symptoms either of peritonitis or of peri-typhlitis have ensued.

It is possible that chronic constipation may be an important factor in the production of a tendency to the malady now under discussion, but many cases occur in which the action of the bowels has always been regular.

Inflammation of the wall of the cæcum itself may occasionally be brought about by the irritation caused by foreign bodies which have been swallowed. We have met with a case of this kind in a boy of twelve. A large number of cherry and grape stones were found in the cæcum, which was extensively ulcerated. The calibre of the gut in this locality was so much reduced as to admit with difficulty the tip of the little finger; and it was found that the wall of the cæcum was greatly thickened from chronic inflammation, and that the shrinking of the newly-formed interstitial tissue had caused the serious narrowing of the bowel just mentioned. The mucous membrane of the cæcum was destroyed for more than an inch in length. The remainder of the large intestine was collapsed, while the coils of small intestine just above the cæcum were greatly dilated. The appendix could not in this case be detected, it being inextricably mixed up with products of chronic inflammation, and closely adherent to the cæcum itself. But the foreign bodies were certainly found in the cæcum, though they may have gained the cæcal cavity by passing from the appendix.

There is some reason to believe that acute peritonitis may be set up by the presence of the *bacterium coli* in the vermiform appendix, should the aperture of the latter into the cæcum be occluded by fæcal impaction. The effects of the *bacterium coli* in exciting inflammation are but imperfectly understood; but it is known that, although as a rule a harmless denizen of the intestinal tract, it may, under conditions in which it is sequestered and confined, become exceedingly virulent. It is possible that if the organism

be pent up in the appendix it may, and that without any special breach of surface of the appendix wall, set up inflammation of the peritoneal covering of the latter, which rapidly spreads and leads to general peritonitis. We have seen a case in which the peritonitis was incapable of explanation on any other hypothesis, and several similar instances are now on record.

Treatment.

Peri-typhlitis should be treated by rest in bed from the earliest moment possible, and by the strict avoidance of aperients of all kinds. Warm light applications, *e.g.*, spongio-piline, with oil of turpentine or tincture of opium sprinkled thereon, may be applied to the right iliac region. Belladonna, together with mercurial ointment, may also be of service as a local application. Opium should be administered in doses sufficiently large and often repeated to ensure repose. The diet should consist of milk, with beef-tea and broth. Should marked febrile disturbance be present, saline draughts may be administered. Under treatment such as this, most cases do well. When it becomes necessary to have the bowels open, an enema should be used. At a later stage small doses of castor oil may be administered by the mouth. Should an abscess form, surgical treatment will be necessary.

During convalescence, and, indeed, for long after an attack of peri-typhlitis the greatest care must be taken to ensure regular daily evacuations of the contents of the bowels, and the diet must be strictly regulated. All irritating matters, such as nuts, or other indigestible articles, must be scrupulously avoided. But under any circumstances, there is considerable risk of a recurrence of the disease.

In cases of repeated attacks of the malady, and in view of the danger attending these recurrences, there has been a greater tendency of late years to adopt bolder measures. Laparotomy has been performed and the appendix removed. Very successful results have followed this mode of treatment. If an operation is decided upon it should, of

course, be performed in the interval between the attacks.

In the fulminating cases of peri-typhlitis there can be no question whatever as to the propriety of performing the operation of laparotomy. If left without operative interference, these cases die. Experience favours the procedure, and many instances are now on record in which, even when purulent peritonitis was present, recovery has followed early opening of the abdominal cavity. It seems to us that, the results of opium treatment and of *laissez faire* policy being so extremely unsatisfactory, there can be no doubt as to the propriety of surgical interference being urged, indeed pressed, in those cases in which, from the general condition of the patient and absence of severe collapse, there is reasonable hope of the shock of the operation being recovered from.

One other point remains for remark: It seems to us that in laparotomy performed for acute peri-typhlitis in connection with disease of the appendix the latter should in all cases be removed. It is not possible, from the limited inspection allowable during operation, to pronounce with certainty upon its condition. Even if whole—that is, if no perforation be present—it may be full of pus, and under such circumstances it is evident that the cause of the disease remains in the body unless removal of the appendix be effected.

INTESTINAL PARASITES

Tænia—*Tape-worm*

THE most common parasites found within the intestinal canal are the tape-worms. There are several species of the genus *Tænia*, of which *T. mediocanellata* and *T. solium* are the most important. *T. mediocanellata* is one of the most usual species of the genus present in the human intestine; it may acquire great length, even twenty or thirty feet. The body consists of a roundish head, about the size of a large pin, and which is provided with four suckers, but possesses no hooklets. The head is followed by a long narrow neck, after which come the very numerous flattened segments. The uterus consists of a longitudinal tube giving off branches; certain of the segments contain ripe ova, and these are discharged with the fæces of the host. The ova, when they obtain access to the alimentary canal of the ox, hatch, and, perforating the intestinal wall, become lodged in the muscular tissues and organs generally in the imperfect or cysticercus form of the organism. In the ox the resulting disease is known as "measles"; when "measly" beef is eaten, the human intestine, being a suitable habitat, the cysticercus attains its mature development, and a tape-worm results.

Precisely the same remarks as regards development apply to the *T. solium*. But in this case the cysticercus form is attained, not in the body of the ox, but in that of the pig. When this "measly" pork is eaten, the *T. solium* is developed in the intestine. The animal differs in several respects from the *T. mediocanellata*. It

has a smaller head, is provided not only with suckers, but also with hooklets, by means of which it adheres to the intestinal mucous membrane with great tenacity. Its length is less than that of *T. mediocanellata*, varying from about eight to fifteen feet.

Another parasite belonging to the same group is the *Bothrioccephalus latus*. This animal has a much more restricted distribution than the forms just described, occurring in the neighbourhood of the Baltic and in some other localities. It is supposed that the cysticercus form is passed through in the bodies of certain fish.

Symptoms due to tape-worms are practically *nil*. A vast number of symptoms are popularly attributed to the presence of these parasites, but it nevertheless remains a fact that it is extremely doubtful if they are responsible in any way for those troubles generally credited to them. Itching at the nose, grinding of the teeth, pains in the abdomen, diarrhoea, and a host of other complaints are often said to be due to the presence of a tape-worm. Were it not that the segments (*proglottides*) were passed by the bowel, in all probability these symptoms would never have been heard of.

The diagnosis, of course, depends upon the presence of the proglottides in the evacuations.

Tæniæ occur at all ages, and in both sexes.

Care should be taken to avoid the ingestion of measly pork, or of measly beef. It appears that both in the ox and the pig there is a special tendency for the muscles of the jaw and the tongue to be the seat of cysticerci, so that these portions of the carcase should be specially examined. For the removal of tape-worm it is essential that, for the day preceding medicinal treatment, little or no food should be taken, and that the bowels be cleared out by an aperient, such as castor oil. In the evening a dose of liquid extract of male fern should be given, and in the morning another dose of castor oil should be taken. This procedure will certainly bring away a large quantity

Treatment.

of the worm, but as long as the head remains fresh proglottides will develop. Thus it is very important that the evacuations be examined for the presence of the head. The head of the *T. solium* is more difficult to dislodge than is that of the *T. mediocanellata*, on account of the hooklets with which the former is provided. Pomegranate root is also recommended as an anthelmintic.

In all cases care should be taken to ensure a regular and healthy action of the bowels, and to correct any dyspeptic symptoms that may be present.

Ascaris—Round Worm

Amongst the nematoid worms, there are two to which attention must be directed, as they are frequently present in the human intestine. These are the *Ascaris lumbricoides*, or round worm, and the *Oxyuris vermicularis*, or thread worm. The *Ascaris* is a round yellow worm, pointed at both ends, and transversely ridged. The male is smaller than the female, being about six to eight inches long, while the female varies from eight to thirteen inches in length. The worms may occur singly, or in large numbers, sometimes forming masses made up of a great quantity of the parasites.

Symptoms.

These worms have a singular tendency to make excursions from the intestine, which is their normal habitat; they sometimes travel into the stomach, and may be vomited; or they pass occasionally into the trachea, causing dangerous symptoms of suffocation. And serious hepatic disease may ensue through *Ascarides* obtaining access to the bile ducts. In some cases symptoms of obstruction have arisen from enormous masses of these worms becoming impacted in the intestine. Apart from these accidents it is, as in the case of tape-worm, extremely doubtful if they cause any symptoms whatever. There is no known cysticercus form of this parasite, and infection of the human organism must, therefore, be direct, from ingestion of the ova.

A cure is readily effected by means of santonin. It is best given in combination with calomel. The only disagreeable result of the administration of santonin is the occasional production of yellow vision. It will be usually necessary to give the drug in three or four grain doses (less in children) for three or four nights. Treatment.

Oxyuris Vermicularis

This worm is very small, the female being the larger, measuring about a quarter of an inch in length. It is very active in its movements, white in colour, and usually occupies chiefly the large intestine, especially the descending colon and rectum; but it may occur higher up, and is sometimes found in the cæcum, and even in the appendix, where in some cases it would appear to have been responsible for an attack of peri-typhlitis.

The ova are passed in large numbers per anum, and thence are conveyed to the mouth by the fingers of the patient on account of the scratching which has been induced by the irritation of the worms. It is not perfectly clear how the animal obtains access to the intestine in the first instance. It may be, however, through the drinking water or through vegetables. Oxyurides are chiefly met with in children, but they occur also in adults.

The chief symptom due to the presence of these parasites is itching at the anus; this is especially severe at night, when the animals have the habit of leaving the rectum and of making excursions into the neighbouring parts, such as the vagina. The irritation may be so great that severe inflammation ensues. In children, restlessness, irritability, and febrile symptoms may result from the irritation due to the parasites. Symptoms.

This is generally simple. In all cases attention should be directed to the condition of the intestinal canal, and mild aperients should be given. Local measures often suffice for the removal of the parasites; injections of salt Treatment.

and water, or of infusions of quassia, will generally effect a cure. The injections must be repeated every night for a week or more.

Trichina Spiralis—Trichiniasis

This disease is caused by the consumption of the flesh of pigs, themselves victims of the nematoid worm, the *Trichina spiralis*.

The consumption of trichinous pork by man is followed in a few days by the attainment of sexual maturity on the part of the parasites contained therein. Congress of the sexes ensues, and immense numbers of young trichinæ are produced in the active state. These parasites immediately perforate the intestinal walls, and then obtain access to the muscles of the body; perforating the diaphragm, they gain, also, the thoracic cavity. After a variable interval, during which, as can be readily understood, great disturbance of the general health ensues, the trichina becomes encysted in the muscles. If the patient survive, which is by no means always the case, all symptoms subside, when the parasite becomes quiescent in the muscles of its host, and finally health is regained.

Symptoms.

As a rule, two or three days after the ingestion of trichinous flesh, symptoms of severe intestinal disturbance set in, consisting of colicky pain, diarrhœa, and vomiting. Naturally, the intensity of these symptoms varies according to the number of trichinæ which are set free in the alimentary canal. After the continuance of these symptoms for a short time, a characteristic affection of the muscles arises; this consists in a profound feeling of lassitude and weariness, which later may develop into severe pain in the affected muscles. Such pains may, and often do, appear in about a week from the time the patient was first taken ill. Marked and persistent œdema now appears, and also profuse sweating is complained of.

It need scarcely be said that fever accompanies these

symptoms, depending as they do upon the penetration of the trichinae into the body muscles, and their subsequent encystment in the same. The fever may be moderate, but the temperature is often not less than 104° , or even 106° . The fever is often accompanied by much headache and sleeplessness.

As the parasite has a particular predilection for the laryngeal muscles, it is not to be wondered at that hoarseness and aphonia are frequent symptoms; further, acute bronchitis may complicate the case.

In some instances the patient develops marked typhoid symptoms; in others, lesions of the skin are present.

The whole duration of the malady may be from a month to six weeks, but there are many variations in this respect.

It will readily be understood that this disease is not liable to sequelæ. With the encysting of the active trichinae all symptoms come to an end, but the patient carries the encysted organisms with him for the remainder of his life.

The adult female trichina is about 2.5 mm. in length; the length of the embryo is about 0.12 of a mm. The actual cyst found in the muscles is oval in shape, and about 1 mm. long. The nematoid worm, in its embryonic state, is observed in the cyst to be coiled up in the form of a spiral; the cyst has a definite wall, independent of the surrounding muscles. These cysts are seen with the greatest ease in the affected muscle by the naked eye, and they resemble white specks scattered irregularly in the muscular substance. Under the microscope, the use of a low power will reveal the details of the coiled-up embryo, together with the structure of the cyst wall.

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It has been already mentioned that pigs are very subject to the disease, and that it is from the consumption of the flesh of pigs that the disease is transmitted to the human being.

How pigs themselves become diseased is not very obvious, but it is a well-known fact that rats are very commonly

indeed affected with trichiniasis, and it has been thought that it is by means of these rodents that pigs are infected.

The adult nematodes, by their presence in the intestinal canal, set up catarrh of the same, and this catarrh may be found post-mortem. Microscopical examination of the affected muscles reveal the presence of the characteristic cyst, and in some cases fatty degeneration and loss of striation of the muscular fibre may be a further result of the invasion of the muscular structures by the parasite.

Treatment.

Prophylactic measures are of the greatest importance, and can only be carried out by systematic inspection of all meat intended for the market. The laryngeal muscles should receive special attention, for reasons already referred to. Sausages are particularly open to suspicion, especially as they are apt to be imperfectly cooked; for there is reason to believe that, at a high temperature, the vitality of the trichinous cyst is destroyed. Hence, if thoroughly carried out, diseased meat may be rendered harmless by adequate cooking.

It is clear that when sufficient time has elapsed for the parasites to commence their peregrinations, there is but little to be done. Every effort should be made by food and stimulants to support the strength of the patient, but drug treatment is useless. On the other hand, in the early stages, the purging which ensues from the irritation of the intestine by the adult trichinae may tend to remove the parasites. The administration of purgatives, and washing out of the stomach, may aid nature in her efforts to get rid of the cause of disease, and are therefore advisable. Whether any drug may have a lethal effect upon the parasite itself is most doubtful, but it has been thought by some that salol, or the sulpho-carbolates, turpentine, or other drugs such as menthol, may have an influence in this respect. There can, at all events, be no harm in administering such remedies in the hope of killing the parasites, and thus of avoiding the very dangerous stage of the disease which arises during their exodus

from the alimentary canal and entrance into the muscles.

Ankylostomum Duodenale

The presence in the intestine of this nematoid worm Symptoms. causes occasionally signs of gastro-intestinal irritation, but very often no such symptoms are complained of. The most prominent feature, and that which is most characteristic of the disease, is anæmia, often very severe, which is evidenced by the usual symptoms. The ova of the ankylostomum are passed from the bowel, often in great numbers. It is only by the presence of these ova in the dejections that the disease can be diagnosed.

The parasite is about a quarter of an inch in length; it attaches itself to the mucous membrane of the intestine, more especially to that of the duodenum, but is found also in the jejunum, and lives on the blood which it absorbs. When present in large numbers it is easy, therefore, to understand that great anæmia may result; and it is possible, also, that bleeding may continue for some time after the bite has been effected, in which case it is obvious that profound anæmia may ensue in cases in which the parasite is present in small numbers only.

The disease is widespread, and is especially common in Egypt, but is met with also in Italy, and was very prevalent among the workmen engaged in engineering operations in the St. Gothard tunnel. The malady is also well known in Belgium. On account of its extreme prevalence in Egypt, this disease is sometimes known as Egyptian chlorosis.

This must be directed to the destruction of the fully- Treatment. developed parasite in the intestine, and to that of the ova in the evacuations. Thymol, administered by the mouth, has been found an efficient remedy.

SPRUE, OR PSILOSIS

THE term "sprue" is a corruption of the Dutch word *spruw*, which is the name by which the disease under discussion is known in Dutch colonies where it is endemic. The word "psilosis" is derived from *ψιλος*, *bare, naked*, from the condition of the intestine which is associated with the presence of the disease.

Symptoms.

The symptoms of sprue affect the alimentary canal. They consist in the onset of troublesome diarrhœa, with more or less characteristic pale, light yellow, frothy evacuations, and in the development, consecutively to the diarrhœa, of soreness of the mouth, tongue and fauces. The diarrhœa may not at first be accompanied by any characteristic feature, and it may be at an early stage of the disease that it is impossible to form an accurate diagnosis; but the persistence of the symptom, with the appearance of soreness of the mouth, will sooner or later excite suspicion as to the nature of the malady.

The general health soon suffers; the patient complains of weakness, headache, and of loss of flesh. As the disease progresses, the bowels may be open many times during the day, the fæcal matters always presenting the pale, frothy appearance already alluded to. Much tenesmus may be complained of; at this time, too, the condition of the mouth may cause serious suffering. It may ulcerate, giving rise to much pain, and difficulty in the taking of food, with great fœtor of the breath. The tongue is morbidly red, and may also be ulcerated.

The functions of the liver appear to be seriously compromised in this disease, resulting in a deficient secretion of

bile. Much flatulence and discomfort after food is often complained of, the result of the dyspepsia from which the patient suffers.

The onset of the disease, although generally insidious, is not invariably so; it occasionally follows acute dysentery, and may commence abruptly with severe vomiting and purging. If taken in hand and properly treated at an early stage the disease may be cured, but in old-standing cases, or in those which have been neglected, death may occur from asthenia, which is induced by the constant diarrhoea and the inability to assimilate food.

The ultimate cause of this malady is not known, but a residence in those localities in which the disease is endemic will render an attack probable. Sprue is a disease which is apparently limited to the continent of Asia, and is prevalent in China, the Straits Settlements, Java, etc. Any debilitating malady will render a resident in these localities more liable to an attack of the disease.

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The post-mortem appearances include an alteration in the condition of the mucous membrane of the small intestine. This, which is the prominent and constant morbid change, consists in a wasting of the mucous membrane, most marked in the ileum, which may be so extreme, that the normal tissue entirely vanishes, being destroyed by erosions or ulcerations, with disappearance of the intestinal glands and villi.

The mouth and tongue are the seat of inflammation, of erosion, or even of ulceration.

No specific for the cure of this disease is known. Treatment. Treatment can only be conducted on general lines. Rest in bed, and the adoption of a milk diet, are the most important measures to be carried out. The administration of drugs does not appear to be in any sense beneficial, and may be injurious.

III. DISEASES OF THE PERITONEUM

ACUTE PERITONITIS

It was formerly thought that acute peritonitis, although not seldom arising consecutively to some abdominal or other affection, was in all respects to be regarded as a substantive disease, and one liable to occur primarily and quite independently of other maladies. This view of the essential nature of the disease can be no longer entertained, for unquestionably acute peritonitis is a secondary affection in all cases, and practically never arises independently.

This matter will be further considered under the heading of causation and morbid anatomy.

The symptoms of acute peritonitis are extremely characteristic, so much so that it is really impossible, if the least care be exercised, to mistake them for those of any other malady. Evidence of the presence of acute peritonitis nearly always presents itself more or less suddenly. Symptoms.

As a rule, the first symptom noticed is pain in the abdomen. This may be, and often is, extremely acute; still, there are exceptional cases in which pain, although severe, is yet not the one prominent complaint of the patient which is usually the case. Pain is often but little complained of when peritonitis occurs as a complication of exhausting disease, as, for instance, when the malady is due to perforation in enteric fever. Extreme tenderness accompanies this pain; it may be so great that the weight of the bed-clothes cannot be borne. In the hope of alleviating the pain by relaxing to some extent the muscles of the abdominal wall, the legs are drawn up while the patient lies flat on his back. Much tympanitic

distension of the intestinal coils is present, giving to the abdomen a rounded prominent appearance, and the surface is found to be extremely tense.

The expression of the face in this malady is very characteristic; indeed, it is often possible to diagnose the nature of the illness by the first glance at the patient's face. An expression of great pain is accompanied with marked pinching of the features. The nose stands out prominently and sharply out from the shrunk cheeks; the lines running from the nose to the mouth are much deepened, and the lips are more or less drawn. The eyes are sunken, and surrounded with dark circles. Frequently the alæ nasi are observed to work, and the respiration is remarkably quickened. If the breathing is carefully observed, it will be noticed that the abdomen takes no part in the movement; it remains still, while the thoracic respiratory movements are much accelerated. This change in the character of the breathing is, of course, more evident in men than in women; it depends upon the fact that the descent of the diaphragm greatly increases the pain in the abdomen, and for this reason the patient involuntarily checks the diaphragmatic excursion as much as possible.

The effect of acute peritonitis is felt at an early stage upon the circulation. The radial pulse very soon acquires a thready character, and is at the same time much increased in frequency; it may be 120, 130, or even more rapid than this. The pulse quickly loses force, and often becomes "running," being so rapid that it is impossible to count it. The sharp, thready pulse of acute peritonitis is very characteristic of the disease, and when once felt is not likely to be overlooked in the future.

Vomiting is often an urgent symptom, and tends to still further reduce the patient.

As a rule, the bowels are obstinately confined; this symptom is not seldom misinterpreted, it being thought that the whole illness is the result of "obstruction," whereas the constipation is really due to the intestinal

paralysis which is itself the result of the acute inflammation of the peritoneum. In some cases diarrhoea is present throughout.

Frequently there is complete retention of urine.

The mind of the patient is usually clear during the whole illness.

There is in this disease a most marked tendency to collapse; in the course of some hours the weakness greatly increases; the patient lies lower in bed; the pulse loses force and tends to become uncountable, cold sweats break out on the face and elsewhere, the features become more and more drawn and pinched, and the complexion tends to assume a dusky hue. In no long time the pulse becomes imperceptible, and the patient dies profoundly collapsed. Constant vomiting may persist until near the end, and it may become a continual outpouring of the contents of the stomach and intestines.

Acute general peritonitis is a most fatal disease; it may be said that nearly all cases are mortal if nothing can be done with the view of removing the cause of the condition by a surgical operation.

Most cases die within twenty-four or thirty-six hours of the commencement of symptoms.

The temperature in this disease, often high at the outset, has a marked tendency to fall with the onset of collapse, and may, before death, attain the normal from a previous elevation of 103° , or may even fall below 98.4 .

In those rare cases which recover, trouble may at a later period ensue from the formation of adhesions resulting in the production of bands by which obstruction of the bowels may be caused.

Reference has already been made to the fact that acute general peritonitis occurs only consecutively to some other morbid action or condition. There is no such thing as idiopathic peritonitis; the malady is invariably secondary.

In by far the larger number of cases the cause is perforation of some part of the wall of the digestive tract,

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such as that of the stomach or duodenum from ulcer, of the ileum from the ulcer of enteric fever, and, very especially, of the wall of the vermiform appendix from ulcer due to the fretting of a faecal calculus. We draw attention to the liability of acute general peritonitis to arise in the latter manner in the cases of youths and young men, but the further consideration of this important subject is undertaken in the article on perityphlitis.

The disease may be due to the extension of inflammation from other organs, as in cases in which pelvic inflammatory lesions light up a general inflammation of the peritoneum. It may also be the result of blood poisoning, and in this way is not uncommon in cases of septicæmia and pyæmia. Further, rupture of accumulations of purulent matter into the peritoneal cavity may set up the most intense peritonitis, as, for instance, may occasionally happen in hepatic abscess or hydatid disease.

It is scarcely necessary to say that acute peritonitis may be the result of severe injury to, or of perforation by wound of, the abdominal cavity.

Among exceptional causes of the disease may be mentioned lesions of the ovary. We have seen death ensue from acute general peritonitis in the case of a young girl, previously in all respects healthy, in whom the inflammation of the peritoneum was due to a rupture of the most recent corpus luteum. This was situated immediately beneath the peritoneal investment of an otherwise normal ovary, and, probably as the result of an effort, this investment gave way, with escape of the contents of the cyst into the peritoneal cavity. A record such as this should make us extremely loath to admit the occurrence of idiopathic peritonitis; for it is the fact that, if searched for sufficiently, a cause of the disease will practically always be forthcoming. All such "causes" as exposure to cold and wet cannot be accepted, and should no longer be admitted in discussing the etiology of acute peritonitis.

The morbid anatomy of acute general peritonitis includes the following appearances.

The abdomen is often much distended and tympanitic. On opening the abdominal cavity there is often a very offensive odour, especially if the gas contained in the intestines be allowed to escape by incision of the wall of the bowel. An accumulation of fluid may be met with in the peritoneal cavity, which may be turbid or blood-stained, and is often purulent.

The coils of intestine are much distended, and there is a general loss of polish; in passing the finger over the surface of a coil it will be found to be sticky and rough. At the points of contact between the various coils slight, but easily overcome, adhesions are met with, and the opposed surfaces are mutually reddened. The loss of polish, the stickiness, and the adhesions are due to the effusion of lymph, which is the result of the inflammatory process.

In severe cases all these appearances are accentuated, and lymph may be present on the peritoneal surface in large flakes.

A similar condition is found to affect the parietal peritoneum, and in the worst—that is to say, the purulent—cases, the whole contents of the abdominal cavity are bathed in a most offensive pus.

It should be noticed that the morbid changes are always most marked in the immediate neighbourhood of the lesion, whatever it may be, on the presence of which the peritonitis depends. This is, of course, because the exciting cause has exercised its most virulent influence at the point at which it first acts.

The condition of the organs generally presents no marked alteration or characteristic features. If the temperature has been high, there may be softening and enlargement of organs such as the spleen, and the lungs will be probably found to be markedly œdematous. The only other important changes are observed in the structures, lesion of which gave rise to the fatal peritonitis.

Treatment.

From what has been said as to the causation of the disease, it will be gathered that the treatment of acute general peritonitis is both difficult and anxious.

Above all things, it is necessary to make an accurate diagnosis of the cause of the malady; the latter itself is detected with the greatest ease, but much obscurity surrounds the determination of its cause in a given case. It may safely be said that no treatment is less likely to be successful than that which consists in making the diagnosis of peritonitis, and then of doing no more than to administer opium. The majority of cases so treated die, and post-mortem it is discovered that, being due to a perforation of the intestinal or gastric wall, a laparotomy would, at all events, have given them a chance. It should, then, be the endeavour of the practitioner, in all cases, to determine the cause of the symptoms, and there is less difficulty in doing this in some cases if it be borne in mind that in youths and young men, previously healthy, the chances are that it is the appendix which is at fault; in young anæmic women it is often ulcer of the stomach which is responsible for the symptoms; and in middle-aged men duodenal ulcer is by no means seldom the *fons et origo mali*. In all such cases the abdominal cavity should be opened; and this being done on present-day antiseptic principles, there is fair reason to anticipate a successful result. But it is of the highest importance that such operation be performed early. To temporise by giving opium in these cases, and only at the latest stages to undertake operation, is to court disaster.

It must be understood that these remarks apply *only* to acute *general* peritonitis; when the affection is local only the opium and rest treatment is most advantageous, and is fully explained in the article on peri-typhlitis.

When acute peritonitis is the result of septic conditions the outlook is extremely serious. Operative treatment is useless, and all that can be done is to support the general strength by nourishment and stimulants.

In nearly all cases in which the disease is caused by

the perforation of enteric ulcer, death ensues. The patient, worn out with prolonged fever, is in no condition to bear operative interference, and, as a matter of fact, practically all such cases die whether operated on or not.

It should never be forgotten that retention of urine tends to occur in this malady, and special attention to the condition of the bladder should be the rule at every visit to the patient.

TUBERCULAR PERITONITIS

TUBERCULAR peritonitis may occur as a substantive disease, but far more frequently it is connected with a more or less general tuberculosis, or with tubercular disease of the mesenteric glands, the so-called "tabes mesenterica." Very often the lungs are affected with tubercular deposit, and occasionally there is co-existing tubercular ulceration of the intestinal mucous membrane.

Symptoms.

The very earliest symptom of the disease is often gradual increase of size of the abdomen. Pain in the same locality may also be present, may, indeed, be severe; but it is very often slight, and causes no special remark. Some tenderness on pressure of the abdomen may be noticed. The onset of the disease is always attended with general symptoms. At first these are slight, consisting of weakness, loss of appetite, and night sweats; but as the disease progresses, loss of flesh is a prominent feature, the face becoming thin, drawn and haggard, and the skin often dry and scaly. The thermometer shows the presence of hectic fever, the temperature rising at night and falling in the morning; but intervals of apyrexia occur, and last for several days. The appetite may remain good; more often the patient is fanciful and capricious concerning his food. The bowels may be confined, but frequently diarrhoea is present, and this is always the case when ulceration of the intestinal mucous membrane co-exists.

Examination of the abdomen shows enlargement of the same, often with tympanitic distension. It is not usual to meet with a well-defined tumour, but when such a mass is encountered it generally consists of the thickened and

contracted great omentum, of enlarged mesenteric glands, or of a mass due to matting together and fixation of portions of the intestine, possibly with the enclosure of small quantities of fluid. Ascites is often present, and may be detected in the usual manner. Sometimes the fluid, being enclosed in loculi formed by the matted intestinal coils, does not respond to changes of position on the part of the patient. Very often, however, fluid is entirely absent throughout the disease, or if present, its quantity is very small. Fluid present at one time may be absent at another, to return towards the fatal end.

A very significant physical sign is the presence of a red, inflammatory ring round the umbilicus, and this may develop with very great rapidity. There is considerable thickening of the inflamed area, and it is generally very tender on pressure. In rare cases this condition may end in suppuration; the abscess bursts, and pus is discharged from the peritoneal cavity. In most instances, however, after a short time, the redness and tenderness disappear.

Occasionally auscultation of the abdominal parietes reveals the presence of a friction sound, due to the rubbing together of the inflamed serous surfaces. Frequently, unless the distension is excessive, it is possible to feel enlarged mesenteric glands through the abdominal wall, and even if the enlargement cannot be ascertained by reason of the tympanitic distension, yet under these circumstances a rectal examination will enable the increase of size of the glands to be made out. Abscesses may be formed in the abdominal cavity, and the pus being enclosed between the coils of intestine, these suppurations may cause multiple tumours to be felt on physical examination. An abscess may perforate the abdominal wall, with a resulting fistulous opening, or it may penetrate the intestine and be discharged per anum. In rare cases the bladder may be perforated.

It has been already mentioned that co-existing lung disease may be present; in some cases, pleurisy with effusion

may be associated with peritonitis, both being due to tuberculous disease of the respective serous membranes.

In the female, care must be taken not to confound tubercular peritonitis with disease of the ovary. Many cases are on record in which this mistake has been made, the tumour not seldom present in this disease being considered to be the enlarged ovary. Care and attention to the history of the case, the result of vaginal examination, a study of the temperature chart, and the careful examination of the lungs, will generally prevent the possibility of an error in diagnosis being committed.

The prognosis in this disease is very serious, but cannot be said to be altogether hopeless. Cases occur in which, after the appearance of the most threatening symptoms, improvement ensues, and in some this improvement is permanent. In this connection, however, it is extremely important to be aware that in tubercular peritonitis there is a natural tendency to alternations. Improvement and relapse may occur in successive periods for a long time, but there is reason to believe that in nearly all cases the malady is ultimately fatal, at all events in adults; in children the prognosis is better.

In surgical practice cases have occurred in which the abdomen has been opened, and the existence of the disease established by ocular inspection, and yet the patient has recovered, and been in good health some years afterwards. Naturally, when there is associated tubercular disease of other organs, the prognosis is far worse than when the disease is strictly limited to the peritoneum.

This malady occurs at all ages, but is relatively more often observed in children between the age of four and puberty; the duration varies greatly, frequently it lasts for many months; other cases are very rapid in their development and course.

As in other manifestations of tuberculosis, there is reason to believe that in that affecting the peritoneum the tubercle bacillus plays an important part.

There is little doubt that in all cases of this disease there must be a primary focus of caseation and softening whence the infection takes its rise. Doubtless in many cases this focus is situated in the mesenteric glands. In some cases tubercular disease of the vesiculæ seminales has been the point from which the disease has started. In the female the uterus, ovary, or Fallopian tube may be the first seat of the diseased process. When associated with tubercular manifestations elsewhere, as in the lungs or brain, tubercular peritonitis is, of course, a complication only.

In this disease the peritoneum, both visceral and parietal, the great omentum and mesentery, and very frequently also the mesenteric glands, are the seat of tubercular deposit. The tubercles may be miliary, or of larger size and yellow. The deposit is always particularly abundant in the great omentum, which is usually found to be drawn up into the upper region of the abdomen, and is hard and enormously thickened. Tubercle is generally abundant also in the lateral and posterior regions of the peritoneal cavity. No signs of inflammation may accompany this pathological condition, but much more often chronic peritonitis is present. Fluid is often in small quantity only, and is generally turbid. But there is much outpouring of inflammatory lymph, and consequent matting together of the intestinal coils, in the interstices of which fluid is found. This firm matting of the intestines is one of the most characteristic post-mortem appearances of the disease, rendering it impossible to unroll the intestine in the usual way, inasmuch as the necessary force employed causes the adhesions to break down, with consequent rupture of the intestinal wall.

In some cases tuberculous abscesses are found between the coils of intestine, between the stomach and diaphragm, or elsewhere in the abdominal cavity. Fistulous openings may connect these accumulations of pus either with the exterior, through the abdominal wall, or with the interior of the intestine.

As already stated, it is rare for tubercle not to be found

elsewhere, *e.g.*, in the lungs, pleura, or mucous membrane of the intestines. The frequent association between this disease and tuberculosis of the mesenteric glands should also be borne in mind.

Treatment.

When it is remembered that there is a natural tendency in this malady to, at all events, temporary amendment and sometimes, though rarely, to permanent cure, it is obvious that too much reliance must not be placed upon the supposed beneficial effect of drugs. It has been suggested that linimentum hydrargyri applied to the abdomen may be serviceable. In many cases the relief of pain becomes urgent; this may be attained by the employment of morphia by the mouth or subcutaneously, or by warm applications to the abdomen. It may be necessary to remove fluid by paracentesis for the relief of the patient.

The operation of laparotomy has been recommended, but is not without risk, and its beneficial effects are somewhat problematical. Still, a certain number of cases are now on record in which the abdomen has been opened, sometimes under a mistaken diagnosis, and tubercular peritonitis found. Washing out the abdominal cavity, with removal of ascitic fluid, has been followed in such cases by great improvement, and occasionally by a permanent recovery.

Operations of this nature are only likely to be successful when tubercular disease is confined to the peritoneum. In generalised cases and in those in which suppuration has taken place, good results can scarcely be anticipated.

In all cases, an abundant, nutritious dietary, and good hygienic surroundings, are of the utmost importance. Cod-liver oil is often of great use.

MALIGNANT DISEASE OF THE PERITONEUM

THIS malady is one not often met with, and when the peritoneum is the seat of malignant growth it is practically always secondarily to a similar disease elsewhere, often the intestines, stomach, liver, or pelvic organs.

The symptoms of malignant disease of the peritoneum are pain in the abdomen, which is not, however, usually a prominent feature of the symptomatology, increasing size of the same, the presence of ascites, and of an abnormal mass which may or may not be detected on physical examination. Along with these symptoms there is rapid deterioration of the general health, the patient wastes, and death in no long time ensues from asthenia. It is obvious that, as growths in the peritoneum are practically always secondary, the symptoms of the primary disease will be mixed up with, and more or less overshadow, those due to the malignant growth of the peritoneum, and it is often not possible to say how many or which of the symptoms are really due to the involvement of the serous membrane itself. Symptoms.

Ascites is practically always present, and the fluid, if drawn off, is usually found to be blood-stained. In some cases a distinct tumour may be detected, and this is not seldom the thickened and contracted great omentum. On the other hand, where the growth is diffused, as is very frequently the case, nothing special may be felt, although the uniform infiltration of the affected structures may give rise to a sensation of density and resistance to the hand. Constipation is not seldom present, and may be due to a mechanical impediment presented by the new growth to the normal peristaltic movements. On the other hand,

troublesome diarrhœa may be a prominent symptom throughout. During the course of this malady further growths may develop in the lungs or even in the cranial cavity, by which the attention may be diverted from the abdominal disease.

Malignant disease of the peritoneum is invariably fatal, and that in a comparatively short time. Within a few months of the onset of symptoms the patient usually dies. Both sexes are equally liable to be attacked, and the affection is met with at all ages, but usually in those over forty.

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Hereditary tendency to cancer may indirectly, by causing the development of the original cancerous focus, be the predisposing cause of malignant disease of the peritoneum; but as the latter malady is practically always a secondary one, hereditary predisposition can be regarded only as causative in this restricted sense.

Malignant disease affects the peritoneum in two forms: in the first, the new growth is scattered irregularly over the diseased surface; in the second, there is a diffused uniform growth which tends to thicken the whole peritoneal structure, both parietal and visceral. In this way the peritoneum may assume a thickness of half an inch, or even an inch, from the development in its substance of a yellowish-grey, consistent, malignant new growth which cuts more or less firmly, and is found diffused over the whole surface of the serous membrane. In the scattered form of the disease masses of new growth varying in size from a pin's-head to a walnut are dotted over the whole peritoneal surface, and are in some cases very closely approximated; or, on the other hand, may be separated by islets of apparently healthy peritoneum. The nodules vary in consistence, are of a yellowish or greyish colour, and are very clearly defined. In both forms of the affection the coils of intestine become matted together and adherent; to such an extent, indeed, that it may be impossible to separate them from one another. But this matting and adhesion is more marked in the scattered than in the diffused form; it may

be so well developed in the first case that there may be a most marked resemblance to tuberculosis of the peritoneum; we have seen cases in which this condition of things, together with the drawing up and thickening of the great omentum, made it impossible, from the naked eye appearances, to say definitely whether the case was one of tubercular peritonitis or of malignant disease.

More or less dark coloured or blood-stained fluid is constantly present in the peritoneal cavity, and the primary growth will usually be easily found. It is not seldom a cancer of the intestinal wall which has involved the serous membrane, and thence spread far and wide. The adjacent glands are always involved. Malignant disease of the peritoneum may be carcinomatous or sarcomatous. Both are equally often met with, and not infrequently microscopical examination shows the new tissue to present a lympho-sarcomatous structure. Colloid changes are frequently present in cancerous growths affecting the peritoneum, and are especially apt to occur in the infiltrating, diffuse forms of the disease above described. When this change is present a gelatinous appearance of the new growth is of common occurrence.

There is practically nothing to be done in this mortal disease. Effort must be made to prolong life by the judicious administration of food and of stimulants, and by careful nursing. Treatment.

IV. DISEASES OF THE LIVER

JAUNDICE

JAUNDICE is merely a symptom, but is often so prominent a feature of the illness that it may almost be regarded as a disease in itself. When thus regarded, the malady should be called "simple jaundice," and not "catarrhal," as is too often the case. We are quite in the dark as to the real cause of the condition known as simple jaundice, and it is, therefore, unjustifiable to assume that it is due to "catarrh" of the ducts.

Simple jaundice is generally preceded by symptoms of gastric disturbance. There is for a day or two loss of appetite, flatulence, nausea, and irregularity of the bowels, with probably headache and general *malaise*. The tongue is furred and the breath offensive. Suddenly, perhaps on waking in the morning, the patient is found to be yellow. The yellowness affects the whole body, and is particularly striking in the conjunctiva. The motions are clay-coloured and very offensive, and the urine is deeply bile-stained. There is loathing of food, nausea, and constipation, and there may be some tenderness on pressure in the right hypochondrium. Itching of skin sometimes occurs, and may be a very troublesome symptom. Yellow vision has also been described. The pulse is often slow, being not more than 60. Symptoms.

Physical examination in children not infrequently shows that the liver is enlarged, but in adults, as a rule, this is not the case in simple jaundice. The jaundice being fully developed may last for a week or two, gradually getting less marked. The dyspeptic symptoms persist for a few days, and then begin to ameliorate. The tongue cleans, flatulence ceases, the appetite returns, and as the jaundice

amends the motions again become coloured, and the urine is less deeply bile-stained. In the course of three weeks or so the patient may be quite recovered, at least as regards the jaundice.

But in many cases of simple jaundice considerable debility and loss of appetite persist, it may be for a month or six weeks after the characteristic symptoms have cleared up. At no period of the illness is pain present; should pain be severe, the possibility of the case being one of biliary colic should always be borne in mind.

Whatever the cause, the symptoms of jaundice are always more or less those just described. But in severe and fatal diseases of which icterus is a feature, the latter will be accompanied by the symptoms due to the more serious malady which is the cause of the whole illness.

The prognosis in simple jaundice is very favourable. All cases recover, and that in a short time. It must not be forgotten, however, that the course of what, at the commencement, appears to be merely simple jaundice may be suddenly complicated with high temperature and delirium, and that in such cases the outlook is extremely serious.

Causation
and Morbid
Anatomy.

The causation of the complaint is very obscure. The fact of its being preceded by stomachic disturbance has given origin to the plausible theory that catarrh of the stomach has extended to the duodenum, and thence to the common bile duct. It is needless to say that there is no evidence of this being the case. Not always is jaundice preceded by gastric disturbance; the development of icterus sometimes ensues upon mental emotion; we have known it to occur from anxiety as to the result of an examination. In such cases the question of catarrh does not arise. It is quite possible that cases of simple jaundice may be connected with the passage of gall stones, which do not give rise to pain on account of their travelling easily through the duct.

Jaundice is observed also in heart disease, when compensation has failed. In such cases it is often limited to, or much more marked over, the upper part of the body.

It also occurs in hepatic abscess, sometimes in cirrhosis of the liver, though not usually markedly in this complaint; in tropical fevers and ague, and in septicæmia and pyæmia, as well as in yellow fever.

In febrile conditions, and when occurring, as is sometimes the case, from poisoning of the blood from snake-bite or phosphorus, jaundice is not due to retention, but to a morbid alteration and destruction of bile.

In some cases it may be due to over-secretion of bile, or to the absorption of the latter as the result of obstinate constipation.

In rare cases jaundice occurs without apparent cause, is very intense, and accompanied with high continued fever. A fatal termination is frequent in these cases. We have recently met with an instance of this description in which the jaundice was intense. The liver was much enlarged, but there were absolutely no local lesions which would explain the symptoms; caries of the right petrous portion of the temporal bone was well marked, but there was no suppuration either of brain or meninges. It is possible that cases such as these may be regarded as pyæmic, the jaundice being merely a symptom of pyæmia.

Mention has already been made of the fact that jaundice occasionally follows anxiety or worry; it may also ensue on severe mental shocks, in which case it must obviously depend upon nervous change.

Any condition causing obstruction to the passage of bile into the duodenum will, of course, give rise to jaundice, the so-called obstructive jaundice. Thus a mass of malignant disease pressing on the common bile or cystic duct, an impacted gall-stone or other obstacle blocking the lumen of these passages, will be productive of jaundice.

The morbid anatomy will, of course, be that of the malady upon which the jaundice depends. Jaundice, being merely a symptom, has no morbid anatomy *per se*.

The treatment of simple jaundice is capable of being expressed in very few words. It is a complaint that tends to get well of itself, therefore the less actively it is treated the better. Treatment.

If vomiting and nausea are complained of, effervescing draughts with a few drops of dilute hydrocyanic acid may give relief. The bowels must be kept freely open, and at the outset a mercurial purge is useful. Alkalies may be administered during the course of the disease. Some have confidence in dilute nitro-hydrochloric acid; some pin their faith to taraxacum; others, again, believe in chloride of ammonium. The fact is that all these so-called remedies are useless. Itching of the skin is occasionally troublesome. In some cases this symptom is relieved by acid baths; in others, alkaline or borax lotions appear to be more efficacious.

Bearing in mind that the supply of bile is temporarily absent from the intestine, it stands to reason that the diet should be plain and simple, free from all aliments likely to lead to fermentation, and from those the digestion of which is specially aided by the biliary secretion. Milk is an excellent diet, and this with light puddings, eggs, and a small quantity of fish should form the staple food. Pastry, alcohol, and sweets should be rigorously excluded.

When jaundice is merely an incident in the progress of other maladies, its treatment will be included in that of the disease on which it depends.

ICTERUS NEONATORUM

WHEN jaundice is present at birth, or appears soon after this event, it is described as *icterus neonatorum*.

In such cases, it may be that the jaundice is of comparatively trivial importance, being induced by easily removable causes; or, on the other hand, it may be due to grave structural defects affecting the bile ducts, or to the presence of syphilitic disease of the liver. Very fatal jaundice may also arise from pyle-phlebitis, the result of inflammation of the umbilical cord.

In all these different forms of jaundice the affection may be fully developed at the time of birth, or it may not appear until some days afterwards. In the simple cases—those, for instance, in which the jaundice has been due to absorption of bile, but without structural disease or defect—the child may be born jaundiced, and yet in a week or two the colour becomes healthy, and every trace of the malady has vanished. In such cases no serious symptoms appear at any period of the affection. Again, a child may be born in all respects healthy, but in a few days becomes deeply jaundiced; no untoward symptoms ensue, and in the course of some weeks the child is perfectly restored to health.

Very different is the course of the affection when depending upon syphilitic disease of the liver. In this malady the outlook is extremely serious, and death generally ensues. In such cases secondary changes of cirrhotic nature occur in the liver, and so-called “biliary cirrhosis” is set up.

It need scarcely be said that when jaundice is due to defect of the bile ducts the case is a hopeless one. When arising from this cause jaundice may be well marked at

birth, but it may not appear until some days later. However this may be, the icterus soon becomes very intense, and the skin may even assume a greenish hue. A marked tendency to bleed from the mucous orifices is not seldom observed in such cases; sometimes the hæmorrhage occurs from the umbilical cord. Under all circumstances this tendency to bleed is a most fatal indication. The general condition of the infant when jaundice is due to defect of the bile passages is always most unsatisfactory. It is invariably extremely weak, and often rapidly wastes. Death, if not due to exhaustion, will possibly ensue from hæmorrhage from the umbilical cord or from some mucous orifice; or it may occur in a convulsion.

Those cases in which pyle-phlebitis results are also very fatal. Inflammation of the cord is due to septic absorption in most cases, it may be from negligence in dressing the cord. In addition to jaundice, the liver may be enlarged and tender; the case is practically one of septicæmia, and death may in some instances be directly due to hæmorrhage from the cord. Or, again, it may ensue from any of the effects which are so often lethal in septic infection of the general system, *e.g.*, pneumonia.

In those cases in which the jaundice is *simple*, health is recovered spontaneously, and no special treatment is required. In those which depend upon the presence of serious liver disease, upon septic absorption, or upon congenital defects of the bile ducts, no treatment is of any avail. There can be no objection to the administration of small doses of grey powder, if thought desirable. In order to avoid that fatal form of jaundice which arises from infection of the umbilical cord, the strictest antiseptic precautions must be followed in dressing the same. But when pyle-phlebitis and septicæmia are actually developed, no treatment will avert the fatal event.

Jaundice is by no means uncommon in older children, and in them differs in no respect clinically from simple jaundice when occurring in adult life. The prognosis in such cases is altogether favourable.

GALL-STONE COLIC

THE passage of a biliary calculus through the cystic or common bile ducts often gives rise to severe attacks of pain, frequently followed by the appearance of jaundice.

The symptoms of gall-stone colic are violent attacks of Symptoms. pain, accompanied sometimes by vomiting and faintness, and followed by jaundice, which may be slight or severe.

As a rule, the attack commences suddenly. The patient is seized with excruciating pain in the abdomen, which may be seated in the right hypochondriac region, the epigastrium, or elsewhere. This pain may be so violent that the patient cries out, or even rolls on the floor. It may be continuous, or after some minutes' duration may pass off, to return after a short interval. These paroxysms may occur again and again, so that the duration of the whole attack often continues for some time, it may be for hours, or even for several days. Generally the pain ceases as abruptly as it commenced, the calculus having either passed into the duodenum or having slipped back into the gall-bladder. Vomiting may be a severe symptom, being both persistent and exhausting. In some cases the patient becomes collapsed; the pulse may be almost imperceptible, the face pale and ghastly, and the respiration sighing. Again, actual syncope may occur. Shortly after the cessation of these symptoms, but not in all cases, jaundice appears, and will be general, though not usually deep. The motions and urine, of course, show the changes incidental to jaundice. The yellowish discoloration of the skin, assuming that the calculus has passed into the intestinal canal, is not usually of long duration, and the patient is soon restored to health. In all cases, however, there is a great tendency to relapse, and a

person having once suffered from biliary colic is almost certain to experience future attacks of the malady.

In some cases the gall-stone becomes impacted more or less permanently in the duct. In such instances jaundice will be persistent, and will probably be accompanied with pain and with enlargement of the liver, possibly also with dilatation of the gall-bladder, a combination of physical signs which may lead to much difficulty in diagnosis. In others, again, inflammation of the wall of the duct, or of the gall-bladder, may be set up, and even suppuration may ensue, when danger of pyæmia is by no means remote. Passage of a gall-stone has even been known to lead to rupture of the common duct. It need scarcely be said that such an accident is attended with the symptoms of extreme shock, rapidly followed by those of acute peritonitis. Happily, these untoward results are rare, and the prognosis of cases in which symptoms are due to gall-stones is generally good.

The subjects of gall-stones, though of both sexes, are usually women of full habit and middle age. The tendency to gall-stones appears to increase as age advances, up to sixty.

In cases in which gall-stones have led to the existence of persistent jaundice, it has been noticed that intermittent febrile temperatures may occur.

In some cases gall-stones do not pass through the ducts (cystic or common), but remain in the gall-bladder, and no symptoms of colic occur. But great danger may ensue from their retention in the gall-bladder on account of extreme distension of the same, should the cystic duct be blocked at its origin. The distended gall-bladder can then be felt through the abdominal wall as a rounded, fluctuating mass. In such cases no symptoms whatever may occur. But more often attacks of pain, but not of colic, recur from time to time, and there is some digestive disturbance, but no jaundice. These attacks are apt to be brought on by dietetic error, or by over-exertion.

Further, gall-stones may excite inflammation of the walls of the gall-bladder. Then, unless adhesion of the inflamed portion of the structure to surrounding tissues occurs, perforation into the peritoneal cavity may ensue, and cause a fatal peritonitis. If previous adhesion takes place it will generally be to the bowel, in which case the gall-stone, should ulceration occur, will escape into the intestine. On the other hand, should adhesion be effected with the abdominal parietes, and destruction of the tissues at the point of adhesion ensue, the gall-stone may be discharged externally. But suppuration of the gall-bladder may arise, and the abscess may burrow in various directions, or may open into the intestine.

The dangers of gall-stones are not over even when the concretion has attained the intestinal canal. In rare cases insuperable obstruction of the bowels may be caused by the impaction of a gall-stone in the small intestine, and unless laparotomy be performed, death is usually inevitable. Should the operation be immediately successful, the impossibility of removing the stone, except by incision of the bowel, makes the ultimate recovery of the patient a question of grave doubt.

It is impossible to account satisfactorily for the occurrence of gall-stones. It has been said that they may be due to sedentary modes of life, with over-indulgence in eating and drinking. It is true that in some cases such conditions are in evidence; but in others the surroundings of the patient, his diet, and mode of life have been in all respects unexceptionable. Further, at post-mortem examinations it is quite usual to meet with gall-stones in very large quantities of the presence of which no suspicion existed during life, and in the bodies of those who have "scorned delights and lived laborious days."

Causation
and Morbid
Anatomy.

That individual idiosyncrasy, of which the explanation is obscure, has the preponderating influence in the formation of gall-stones admits of neither doubt nor question.

Gall-stones may be found in the gall-bladder, in the biliary passages, or in both; they may also be met with in the

intestine. But the gall-bladder is the locality in which they are most frequently encountered. They are of various sizes, from a minute speck to a mass as large as a walnut, or even larger, up to the limits of the gall-bladder itself. They are often arranged one against the other, being faceted at the points of contact. They may be black, brown, or yellowish in colour; they float in water, are easily cut by a knife, and are even friable. They are composed essentially of cholesterine, together with bilirubin. The nucleus appears to consist, in many cases, of epithelial cells, and on section the gall-stone presents usually a more or less stratified appearance.

Treatment.

As regards the treatment of gall-stone colic, it may be divided into that of the attack itself and of the inter-paroxysmal period. The relief of pain is the great aim and object of treatment during the attack. This can be effected by the use of morphia, either by the mouth or hypodermically. Chloroform may be administered if thought desirable, and a warm bath is often of service. Between the attacks attention to diet is of great importance. Alcohol must be given up, and all rich foods avoided. Alkaline waters should be taken freely, and the bowels must be kept regular by saline purgatives. The treatment by the ingestion of large quantities of oil, which has been recommended, is perfectly futile.

In chronic cases, and when jaundice is persistent, the advisability of an operation should be weighed, but it must never be forgotten that patients, the subjects of jaundice, bear operations badly, and that none must be undertaken when the condition is due to cancer.

When distension of the gall-bladder ensues, with periodic attacks of pain and nausea, the patient should be put to bed, and kept there until the symptoms have subsided. These attacks tend to recur at intervals, and sooner or later it is generally necessary to consider the propriety of surgical interference, with a view to the removal of the stone from the gall-bladder.

When the irritation of a calculus has led to the formation of an abscess, and pyæmic symptoms have supervened, the case is practically hopeless; but there can be no objection to the employment of antistreptococcic serum, though it would be a great mistake to be sanguine as to the results to be obtained by this mode of treatment.

CANCER OF THE GALL-BLADDER AND BILIARY DUCT

IN some cases cancer attacks the common bile duct, involving frequently the neck of the gall-bladder; or it may occur primarily in the latter situation. In either case the outlet from the gall-bladder becomes closed.

Symptoms.

The symptoms of this affection consist in the presence of a dilatation of the gall-bladder, together with the clinical features characteristic of malignant disease, and of severe and persistent jaundice. It is often possible to detect the enlarged gall-bladder by palpation and percussion, and it may also be felt as a fluctuating sac, or as a hard mass of malignant disease. In either case the tumour is dull on percussion. Wasting and progressive debility are prominent features in the progress of the malady. Ascites occurs in some cases, and in others pyrexia of pyæmic type may supervene. The disease runs a rapid course; it is invariably fatal. The diagnosis is often far from easy, and it may be impossible to differentiate between this form of malignant disease and that affecting the liver generally; in any case the liver substance itself will, sooner or later, be involved.

Causation and Morbid Anatomy.

There is some reason to believe that the irritation of gall-stones may tend to the subsequent development of malignant disease of the ducts and of the gall-bladder. It is, at all events, a remarkable fact that in primary cancer of these structures gall-stones are constantly found, and in many instances have given rise to previous attacks of gall-stone colic. Advancing years predispose to this malady, and hereditary tendency to cancer certainly plays a prominent part in its causation.

The morbid anatomy of cancer of the gall-bladder differs in no important respect from that of similar disease of the liver, and requires no special description.

The disease being a mortal one, nothing more can be Treatment.
done than to palliate its symptoms. These must be treated
as they arise, and on general principles.

CONGESTION OF THE LIVER

CONGESTION of the liver may be acute or chronic; the former occurs in connection with malarial and other fevers, and as the result of excessive indulgence in stimulating food and in alcohol. The chronic form is due to mechanical causes, of which the chief is failure of the right heart, and it may also ensue in long-standing diseases of the lungs.

Congestion of the liver leads to enlargement of the organ, the edge being smooth and round, and on section the hepatic veins are seen to be gorged with blood, while the periphery of the lobule is often pale from fatty changes. The striking contrast of tint thus occasioned gives rise to the well-known appearance described as "nutmeg liver." The hepatic cells are not usually destroyed, though this may occur in very chronic cases as the result of the growth of connective tissue between the lobules. The consequence then is the development of a very severe form of cirrhosis.

Symptoms.

The symptoms of congestion of the liver are not very definite, being closely related to those of the disease upon which the congestion depends. They consist generally in *malaise*, loss of appetite, pain and tenderness over the right hypochondrium and epigastrium, and sometimes, though rarely, pain in the right shoulder. Slight jaundice is sometimes present, and the urine, which is usually high coloured and scanty, may contain small quantities of bile. Should cirrhotic changes ensue, the symptoms of that condition will develop.

Treatment.

The treatment of congestion of the liver is that of the condition upon which the malady depends, but in all cases alcoholic stimulants should be forbidden.

HEPATITIS—ABSCESS OF THE LIVER

THERE is no line of demarcation between active congestion and inflammation of the liver, unless the inflammatory process leads on to suppuration.

The symptoms of hepatitis not resulting in suppuration Symptoms. are those of severe congestion of the liver; there may be considerable fever, nausea and vomiting, together with marked pain and tenderness in the right hypochondrium, the pain extending to the right shoulder, the liver itself being found on palpation to be somewhat enlarged; jaundice, if present, is not usually marked. In some cases the symptoms are extremely slight, or almost *nil*.

When suppuration occurs all the symptoms just mentioned may be present, and in a much more marked form; in some they are those of pyæmia. The temperature may range high, with evening exacerbations and morning remissions; rigors may occur, followed by profuse sweating, and the patient may pass into a condition of the greatest debility. In such cases the danger to life is great.

The local signs may show nothing more than pain and tenderness in the hepatic region, or in addition there may be obvious local swelling, with dilatation of the superficial veins and some general enlargement of the organ. Fluctuation may be detected in this swelling, and the abscess may point externally, finally discharging its contents in this direction, which is by far the most favourable termination of the disease. On the other hand, discharge may take place into the right pleura, through perforation of the diaphragm; into the peritoneal cavity; or in other directions, in which case most disastrous consequences may result. Occasionally the symptoms of hepatic abscess bear a striking resemblance to those of enteric fever.

Acute non-suppurative inflammation of the liver is due to much the same causes as those which lead to active congestion of the organ. Residence in tropical climates, chronic excess in eating and drinking, and especially in the consumption of alcohol, are among the most usual exciting causes.

Abscesses of the liver are either single or multiple, and in both cases they are generally due to septic absorption, as occurs in dysentery, and more rarely in enteric fever, in peri-typhlitis or in peri-nephritic abscess. Abscess of the liver may also be the result of direct traumatism, or may ensue from the suppuration of a hydatid cyst; it may be caused, further, by inflammation set up in the bile ducts consecutive to the impaction of gall-stones. The abscesses met with in cases of dysentery, and those due to traumatism, are usually single; multiple abscesses are especially liable to arise in connection with general pyæmic infection. The right lobe of the liver is much more often the seat of abscess, when the affection is single, than the left.

An abscess of the liver may be easily recognisable by the naked eye when the organ is exposed, but not cut open; a dome-shaped swelling, which gives rise to fluctuation on palpation, may be easily perceptible. Abscesses of the liver vary greatly in size; they may be mere specks of softening tissue in the early stage, when the process of pus formation is only just commencing, or may be so large as to occupy nearly the whole of a lobe of the organ. Their contents are generally thick creamy pus, of yellowish colour, but in some cases the colour is reddish. A more or less well-defined, so-called pyogenic, membrane generally limits the abscess cavity. In some cases the pus dries up, and its previous presence is represented only by a caseous yellow mass of detritus. Such masses are particularly liable to be the result of the drying up of hydatid tumours of the liver which have suppurated and then become quiescent. The bacterium coli, and both staphylococci and streptococci are

the micro-organisms usually associated with the suppurative process as affecting the liver.

The treatment of hepatitis is the same as that of acute congestion of the liver. Treatment.

The medical treatment of abscess of the liver is extremely unsatisfactory, nor can it be said that surgical intervention is usually of much benefit. Still, as the only sound treatment consists in evacuating the abscess cavity at the earliest possible moment, surgical measures should always be resorted to whenever possible. Unfortunately, however, surgical treatment can only be applied to a limited class of case, and the abscess most amenable to such measures is that which is single and consecutive to an attack of dysentery. Not in all cases, by any means, is it practicable to localise the collection of pus; when abscesses are multiple, it is obvious that it is no longer possible to adopt surgical treatment. Details of the *modus operandi* in the surgical treatment of abscesses of the liver must be sought in the pages of surgical works.

Pyle-phlebitis

Pyle-phlebitis, or inflammation of the vena portæ and its tributaries, leads also to the formation of numerous abscesses of the liver. Pyle-phlebitis is caused by a variety of morbid conditions affecting the digestive track, among which dysentery is prominent. It may also ensue in cases of gastric or duodenal ulcer, after operations upon the intestines, and especially in connection with those affecting the rectum, as also upon perforation of the portal vein or its affluents by foreign bodies, such as fish-bones. Very rarely the disease is consecutive to enteric fever.

The symptoms of pyle-phlebitis are those of multiple hepatic abscess, and always present the features of septic absorption; the disease is most fatal.

Impaction of a gall-stone in the common bile duct may

lead to the development of numerous abscesses in connection with the tributaries of this duct ; or parasites, such as ascarides, etc., may gain access to the ducts, with similar results.

The symptoms are indistinguishable from those of pyle-phlebitis.

There is no treatment for this disease. Nothing can be done beyond palliation of symptoms.

CIRRHOSIS OF THE LIVER—DRUNKARD'S LIVER

THE disease now to be discussed is caused by a chronic inflammatory process affecting the liver, due usually to habitual excess in the consumption of alcohol, especially of spirits.

When a patient is the subject of cirrhosis of the liver in an early stage, the symptoms are not very definite. He complains of loss of appetite, nausea, perhaps of discomfort after food, and of flatulence. Nausea is chiefly experienced in the morning, passing off later in the day. The bowels are often very irregular, diarrhoea and constipation may alternate. Along with these symptoms it is perceived that the general health is more or less impaired. The patient is weary, sleeps badly, and has a distressed appearance. Sometimes the complexion is earthy, and it may be of a slightly yellow tinge, which is especially marked in the conjunctiva. If the habits are at once changed the condition may amend, and the patient's health be re-established; but if this is not the case, other symptoms speedily appear. Symptoms.

The nausea passes into vomiting, chiefly in the morning, and hæmatemesis may ensue. Profuse diarrhoea may supervene, with melæna. The patient often suffers severely from hæmorrhoids, which may bleed profusely. The abdominal cavity becomes filled with fluid; or, in other words, ascites is established. The superficial abdominal veins may be greatly dilated, forming a network, which at once strikes the eye on the patient being uncovered, and is often well marked in the neighbourhood of the umbilicus. The urine is scanty, high coloured, and loaded with urates. Jaundice is often absent, or, if present, slight

in degree. In that variety of cirrhosis known as hypertrophic, jaundice may, however, be a prominent feature from the commencement of the illness.

Cirrhosis is usually afebrile, but occasionally some slight elevation of temperature may be noticed. The body wastes, and in a short time great emaciation may be apparent. The patient becomes weaker and weaker, and if not cut off by profuse hæmorrhage from the stomach or bowels, or by an attack of *delirium tremens*, he may sink and die from exhaustion, or from some intercurrent affection such as pneumonia.

In women, especially, it is not unusual to find the symptoms of peripheral neuritis associated with those of hepatic cirrhosis.

In the early stages of the disease the physical signs are slight. There may be tenderness in the right hypochondrium, a suggestive sign; in some cases at this period the liver may be enlarged. At a later stage the presence of ascites is established by the increasing size of the abdomen, which is distended and tense, dull on percussion in the flanks, the dullness varying with the position of the patient, and a thrill being obtained when, one hand being laid flat over the side of the belly, a gentle tap is made at the corresponding point on the opposite side with the finger of the disengaged hand. When the abdomen is full of fluid it is impossible to determine the size of the liver, but after paracentesis has been performed the organ may be felt, its substance being hard, and its surface finely or coarsely granular.

Causation
and Morbid
Anatomy.

Cirrhosis of the liver is due to excessive consumption of alcoholic stimulants in by far the larger number of cases. The alcohol irritates the interstitial connective tissue of the organ, and especially the interlobular connective tissue. The result is increased growth of this tissue at the periphery of the lobules, with resulting destruction of the adjacent liver cells and interference with the circulation of the blood in the branches of the portal vein. In the early

stages of this process, and before the new tissue growth has commenced to contract, the liver may be larger than normal, but this increase of size very soon gives way to a shrinking of the organ, and also to the loss of its healthy smoothness of surface and of section. The surface becomes finely roughened, owing to its being drawn in by the contraction of the new fibroid growth. On section the lobules can be distinctly recognised, being, as it were, isolated by the invading connective tissue. The colour of the liver on section is generally more or less yellowish, resembling yellow wax, and this peculiarity of tint has given rise to the name of the disease (*cera-wax*). In some rare cases thrombosis of the trunk of the vena portæ has been found, which doubtless accounted for the fact of a considerable ascites being present at a period of the disease too early for the development of connective tissue growth adequate to explain such an abundant collection of fluid.

It is very important to bear in mind that in cirrhosis the hepatic cells are more or less destroyed, as the great mortality of the disease is undoubtedly due to this destruction of the vital elements of the liver structure.

More or less fatty changes are always present in connection with those peculiar to cirrhosis, and many of the liver cells are found to be in an advanced stage of fatty degeneration.

The cirrhotic liver is by no means always small, even when the disease has reached an advanced stage. Very often at autopsies of those dead of cirrhosis, the liver, far from being atrophied, is greatly enlarged, though showing all the changes characteristic of hepatic cirrhosis.

Other forms of cirrhosis are occasionally met with, entirely unconnected with spirit drinking, and it should also be borne in mind that cases have been recorded in which sober workmen in spirit factories have become the victims of the disease through inhalation of the vapours to which they were exposed in their daily work.

Cirrhosis is not in all cases altogether confined to the

connective tissue at the periphery of the lobule. It may affect the interstitial tissue in any situation, but that form, the commonest, due to the use of ardent spirits is undoubtedly the most fully developed at the periphery.

The morbid process may occur around the bile ducts, in which case the liver, instead of being small, is on the contrary hypertrophied. Deep jaundice is a characteristic symptom in such cases, and this form of the malady is known as *hypertrophic* cirrhosis. Again, in chronic congestion of the liver due to pulmonary or cardiac disease cirrhotic changes may ensue; and in syphilis, which causes inflammatory thickening of the hepatic capsule (Glisson's capsule), processes of the new growth may pass into the interior of the organ, and in this way cirrhotic changes may be brought about.

The disease is occasionally met with in children, and it may be in them due to precocious indulgence in spirits, but is more often caused by hereditary syphilis, or by congenital disease affecting the bile ducts.

Treatment.

The first and by far the most important measure is to prohibit all alcohol. It is useless to undertake any rational treatment unless the patient gives up all further indulgence. To obtain satisfactory results total abstinence is a necessity. Unfortunately, it is almost impossible, in the very large majority of cases, to induce the patient to renounce his bad habits.

The diet should be unirritating and easily assimilable. Nothing is better than milk; and if the patient will consent to be put upon an absolute milk diet, his chances of recovery will be much increased. Along with the milk may be given blanc-mange, light puddings, and tea and coffee may be added to the milk to improve the taste and to give variety. As regards drug treatment, the administration of iodide of potassium sometimes gives good results.

When ascites develops, not much is gained by the administration of diuretics and purgatives. When it causes

greatly embarrassed breathing, the operation of paracentesis must be performed. But this operation should be delayed as long as possible. The relief given by the first removal of the fluid is extraordinary ; but, as the cause persists, the fluid reaccumulates, and the rapidity of the reaccumulation is greatly increased after tapping, whilst the strength of the patient steadily diminishes. It may be truly said that with the first tapping, in the majority of cases, the patient's days are numbered.

Throughout the course of the illness digestive disturbances must be treated on general principles, as also must hæmatemesis when it arises. For the relief of constipation nothing is better than the natural aperient waters containing sulphate of magnesia or soda.

ACUTE YELLOW ATROPHY OF THE LIVER

Symptoms. THE symptoms of acute yellow atrophy are jaundice, which is generally the first indication of the disease, delirium, extreme prostration, and a tendency to hæmorrhage.

At the outset there is nothing to indicate that the malady is anything more serious than an attack of simple jaundice. This is so in the majority of cases. But in some, delirium, prostration, and a typhoid state precede the jaundice, which only appears after other symptoms are fully developed. Jaundice is not usually very intense. Delirium may at the outset be noisy and violent, but the patient soon passes into a typhoid state of incoherent muttering, with dry tongue and sordes on the teeth. In this condition control over the sphincters is lost, and the patient soon becomes unconscious. Death is often preceded by coma.

As a rule, the disease ends fatally in a few days. Life is seldom prolonged after the fifth day, and death may occur considerably earlier. A tendency to hæmorrhage often shows itself; it may be into the skin, forming petechiæ, or hæmatemesis and melæna may be present. Vomiting is not infrequent.

Physical signs consist in a rapid diminution in the area of liver dulness, and this shrinking may by careful percussion be followed from day to day. It should be borne in mind, however, that the dwindling dulness may be probably due to a tendency which exists for the liver to fall backwards, and also to the gascous distension of the intestine encroaching on the hepatic area.

Important changes in the urine are present in this disease. It is found that urea, uric acid, and salts are greatly diminished, or even absent, while two abnormal

products are found in the urine, viz., leucin and tyrosine. Bile is not usually present, but the urine may contain blood.

Acute yellow atrophy bears a marked resemblance to phosphorus poisoning, especially in those cases in which the disease begins with jaundice and with no other symptom. In phosphorus poisoning the insidious onset of symptoms is well known, and it is only after a day or two that acute symptoms appear. In phosphorus poisoning neither leucin nor tyrosine appears in the urine, and the history of the case will be of material assistance in making the diagnosis. Further, vomited matters in phosphorus poisoning shine in the dark, and have a characteristic odour of garlic.

The causation of acute yellow atrophy is extremely obscure; in fact, nothing is really known on the subject. It is a disease more often observed in females than in males, and is especially frequent in pregnant young women. It is seldom encountered after the age of thirty.

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Essentially, the disease consists in an acute disintegration of the hepatic cells; these are found to be broken up, fatty, and granular. They ultimately lose all trace of their original structure. The liver is diminished in size, and often markedly yellow in colour. It is extremely fatty, and the texture is often soft and yielding. Fatty changes are often present in the heart and kidneys. The blood is frequently unduly fluid, and the spleen is generally found to be greatly enlarged and very soft. Numerous hæmorrhages may be observed in the substance of the internal organs or of the skin. The occurrence of leucin and tyrosine in the urine is not easy of explanation, but in all probability it bears a relationship to the breaking up of the liver substance, and possibly represents the result of this destruction.

There is no satisfactory treatment for this disease; the malady is invariably fatal, and palliation of suffering is all that is possible.

Treatment.

FATTY DEGENERATION OF THE LIVER

Symptoms.

FATTY degeneration of the liver substance gives rise to no symptoms apart from those of the morbid condition upon the presence of which the degenerative change in the hepatic cells depends.

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The fatty liver may be accessible to physical examination, being uniformly increased in size, with smooth surface and rounded edge. Frequently, however, no alteration in size or shape can be detected even when the fatty changes are present in a very marked degree.

Fatty degeneration of the liver may be induced by too rich food, when taken habitually; it is frequently due to alcoholic excess. The morbid condition is also caused by any disease which interferes with the necessary oxidation of the blood. Hence fatty liver is frequently met with in cases of phthisis.

Certain poisons, in addition to alcohol, also cause fatty changes in the liver. The most striking instance of this mode of causation is poisoning by phosphorus, in which the liver in a few days may become excessively fatty throughout.

This degeneration of the liver cells is not uncommonly observed in cases of anæmia, owing to the diminution of red corpuscles leading to deficient tissue oxygenation.

Microscopically, the changes in the liver are seen to depend upon fatty infiltration of the hepatic cell, and upon simultaneous fatty degeneration of the substance of the same. When the morbid condition has been brought about by too fatty a diet, the former change—infiltration—may markedly preponderate. When alcoholic habits or pulmonary disease is the cause of the affection, actual

degeneration of the cell itself may be the chief alteration. In either case the hepatic cells contain globules of fat, which are highly refractile, and which blacken readily with osmic acid.

The globules are made up by the union of smaller particles of fat, and they tend to push the nucleus on one side; these changes are always most marked at the periphery of the hepatic lobule. Other lesions may also be present, of which fibrosis of the liver is frequently met with when the fatty change is due to alcoholic excess. The combination of fatty degeneration with stasis in the hepatic vein is also very often observed in cardiac cases in which compensation is lost. The dark tint of the centre of the lobule is then markedly contrasted with the light yellow, fattily degenerated periphery of the same, and the contrast of colour has given rise to the term "nutmeg liver," by which this condition is well known.

To the naked eye the liver which is fattily degenerated is large, pale or yellowish in tint, very smooth on surface and section, the latter being greasy to the touch, and the anterior edge is markedly rounded. The size of the liver may not, however, be increased, and when the fatty change accompanies cirrhotic lesions which are well developed, it may be actually smaller than in health. On the other hand, the "nutmeg" liver is always of large size.

This consists in the appropriate management of the condition upon which the fatty change in the liver depends. Treatment.

No special treatment as regards the liver change is necessary, but the diet must be strictly regulated, and adequate exercise should be taken in those cases in which it is indicated.

LARDACEOUS OR AMYLOID DISEASE OF THE LIVER

Symptoms. THE symptoms of amyloid degeneration of the liver are extremely indefinite, and entirely subordinate to those of the disease upon which the lardaceous change depends. At the most, some dragging pain, or merely discomfort, is complained of, due to the great increase in size and weight of the organ.

Ascites does not occur in this affection; neither is jaundice noticed. Attacks of diarrhœa are liable to supervene in the course of the disease, and may be due to a co-existing amyloid change affecting the intestinal mucous membrane. Similar change in the kidney accounts for the presence of albuminuria, which is almost constantly present in this disease.

The physical signs of amyloid disease of the liver are those of great enlargement of the organ; the increase of size may be so marked that the diseased liver occupies nearly the whole cavity of the abdomen. The hepatic surface is smooth and round, as also is the anterior border. The organ is not tender on pressure.

The spleen is usually increased in size, from co-existing lardaceous disease.

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Amyloid degeneration of the liver is generally due to suppuration or to chronic bone disease. Thus, in advanced cases of phthisis, when cavities exist, with progressive destruction of lung, lardaceous changes may be induced in the liver and other organs. Similarly, disease of bone, tubercular or other, of joints, or of the kidney may set up the morbid process in the liver.

Another cause of the affection is syphilis, and, in fact, it may occur in the course of any malady attended with

profound impairment of the general health, such as malignant disease.

In amyloid disease the centre and intermediate area of the hepatic lobule is chiefly affected, that portion, namely, which is the zone of distribution of the hepatic artery. The minute branches of this vessel become impregnated with the lardaceous substance, the inner coat being especially involved, and the morbid process extends from the wall of the vessel to the hepatic cells which surround it. The consequence is that these cells become filled with amyloid material, the result being that they are profoundly altered both in structure and in function. The nucleus disappears, and the cell increases considerably in size, but at a later stage may dwindle.

Whether the amyloid change is due to the infiltration from the blood of a pre-formed material, or whether it is strictly a degenerative process, is not at present determined.

The liver to the naked eye is greatly enlarged, its anterior border markedly rounded; the organ is smooth, and on section presents a glistening appearance and a yellowish colour. It is felt to resist the knife as the latter passes through it. When the cut surface is painted over with a solution of iodine and iodide of potassium, the points of lardaceous disease fix the tint more strongly than do the surrounding more healthy structures. The deeply brown or reddish point, standing out in the uniformly light brown iodine colour, offers an appearance which is characteristic of amyloid disease.

This consists entirely in that of the disease of which the Treatment. lardaceous affection is a complication.

Bone lesions must be treated surgically if necessary, with the view of suppressing suppuration.

Should syphilis be the cause of the amyloid disease of the liver, appropriate treatment must be initiated without delay.

General treatment will consist in the employment of hygienic and dietetic measures, and cod-liver oil and quinine may occasionally be administered with advantage.

HYDATID DISEASE OF THE LIVER

HYDATID disease of the liver may be entirely latent, giving rise to no disturbance of health whatever; more often characteristic symptoms and physical signs are present, of which the following are the chief.

Symptoms.

When, as is usually the case, the lesion is situated on the upper surface of the organ and towards its anterior edge, fulness and slight bulging are noticed over the hepatic region. This fulness increases until a definite tumour is formed, which is hemispherical in outline, dull on percussion, elastic, and which may give a thrill when the procedure to elicit this phenomenon is adopted. As a rule, the tumour is quite painless and not at all tender, but as it grows larger the hydatid cyst may cause inconvenience from its size and from pressure. There is also danger of the rupture of the cyst; it may burst through the diaphragm, the contents thus attaining the pleural cavity; or, again, it may discharge into the peritoneum. This latter accident may or may not lead to general peritonitis, but it will inevitably be attended with symptoms of severe shock; the hydatid cyst may rupture into the colon, or even into the kidney. Rupture has occurred into the pericardium, but this must certainly be a very rare event. Further, the contents of the cyst may suppurate, in which case, to all intents and purposes, a hepatic abscess results, with all its attendant symptoms and dangers; this abscess may rupture in any of the directions just indicated.

It is certain that a hydatid cyst may dry up and become harmless, and it is not very uncommon at post-mortem examinations to have ocular demonstration of this mode of termination of the disease. In examining the liver in such

cases small foci are met with, consisting of cavities containing caseous and other detritus, in which the microscope reveals the presence of the characteristic hooklets. Such cases give no hint, as regards their previous history, of the occurrence of symptoms pointing to hydatid disease of the liver.

This malady is unattended with symptoms of serious hepatic disorder; neither jaundice, nor ascites, nor digestive disturbance is usually noticed. A curious tendency to urticaria has been described by some authors. This skin lesion has been chiefly noticed after rupture of the cyst, or as ensuing on intentional tapping of its cavity. It has, however, been observed in cases in which the cyst has been quite uninjured. It is supposed to be due to an absorption of toxins from the fluid contained in the cyst. Symptoms.

The prognosis of hydatid disease of the liver is doubtful; at any time rupture may occur which may prove fatal, and there is always the risk of the supervention of suppuration. When the cyst is accessible to direct surgical treatment the prognosis is better, as the adoption of such measures is often attended with much success.

This disease is due to the presence, in its imperfect or asexual form, of the *tania echinococcus*, or hydatid. The life history of this parasite is now well known. It is minute in size, consisting of not more than four segments in its mature condition, and in this form inhabits the small intestine of the dog, from which proglottides containing fertilised ova are expelled. These ova obtain access to drinking water, to vegetables, or they may be directly transmitted to the patient from the handling of the dog. Having obtained access to the stomach, the ova find their way to the liver or other organs; they are provided with a resistant capsule, which preserves them in a living condition for a long time. It is probable that, on arriving in the stomach, this hard case is dissolved, and in this way the ova are set free. The pro-scolex, contained in the resisting envelope, is provided with six very characteristic siliceous Causation
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teeth or hooklets; and, probably by the aid of these structures, it perforates the wall of the stomach. Having gained the liver the hooklets drop off, and a vesicle develops round the pro-scolex. This vesicle is the hydatid cyst. In fertile cysts further pro-scolices develop from the wall of the vesicle, and each one of these produces a cyst of its own. These are the daughter cysts, of which great numbers may be found floating in the mother cyst. In some cases this multiplication does not occur; the mother cyst is then said to be barren. The cyst wall is made up of a peculiar and characteristic laminated membrane, and the fluid contained in it is, during the life of the parasite, clear and non-albuminous, but after its death albumen may be present. Hydatid cysts are sometimes single, sometimes multiple.

The dog takes in the echinococcus form of *tænia* with his food, consisting of the flesh of animals themselves the victims of hydatid disease.

The malady is specially prevalent in Iceland, where the dogs form part of the household, living, eating, and sleeping in close proximity with their owners and families.

Treatment. It may be said at once that all attempts to cure the disease by means of drugs are absolutely useless. Iodide of potash and other remedies have been recommended, so has electrolysis—all are completely futile. Direct surgical treatment is alone efficacious. If, owing to the situation of the tumour, complete extirpation by the knife is practicable, excision is by far the best mode of treatment. If excision is not possible, then the cyst should be opened, its contents and wall removed, and the wound left to heal up. Older methods of treatment, now for the most part discarded, are aspiration and the injection of irritant fluids.

When suppuration occurs, the treatment suitable to abscess of the liver must be adopted.

CANCER OF THE LIVER

CANCER of the liver is nearly always secondary, the primary seat of disease being the stomach, the pancreas, the intestine, the lung, the uterus, or the breast.

Thus the symptoms actually due to malignant disease of the liver are more or less bound up with and obscured by those of the primary lesion. For this reason it is that the symptoms of the liver affection are not very definite in every case. Wasting is perhaps the most conspicuous amongst these symptoms; it is always present, and may be very marked and rapid. Jaundice is commonly, but not invariably, observed. It is generally due to the presence of a mass of cancer in the transverse fissure, in this way pressure being induced on the hepatic ducts; but it also arises in those cases in which the neck of the gall-bladder is involved in a cancerous mass, by which the outlet is obstructed. Symptoms.

Pain is not usually a prominent feature; it may be altogether absent, and at the most some slight discomfort may be complained of. But in rare cases the pain may be both severe and continuous. Vomiting may occur, but is not a characteristic symptom. Great feebleness of body is always present, and the patient may be hardly able to move himself in bed on account of the asthenia. The temperature is often normal throughout, but in some cases fever may be present, and this especially in the later stages of the malady. It may in some instances be due to the occurrence of suppuration in the deposits of malignant growth.

The physical signs which characterise this disease depend upon the presence of growths in the liver, which may or

may not be accessible to physical examination. Occasionally the skin over the hepatic region is the seat of a recently developed network of veins, which is due to the embarrassment to the circulation through the liver, induced by the presence of new growth in the organ.

In some cases tumour may be obvious to the naked eye, and in most the liver is easily felt on palpation below the costal margin; it may, indeed, be so much enlarged as to occupy a considerable portion of the abdominal cavity. Outgrowths may be felt from its surface; they may be smooth or uneven, and are often, but not always, firm and hard.

Ascites is occasionally observed in cancer of the liver, but is not often present. It is usually the result of co-existing cancer of the peritoneum; but it may be caused by pressure of the new growth upon the vessels situated in the transverse fissure.

If jaundice is present, it is needless to say that the *faeces* will be clay-coloured and offensive, and that the urine will be deeply bile-stained.

Cancer of the liver is a hopeless disease; death, usually from exhaustion, generally ensues in a few months.

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In the majority of cases cancer shows itself in the liver by the presence of numerous masses of new growth. These masses vary in size from a mere speck to that of a cricket ball, or even larger. Occasionally the different deposits fuse together in certain situations, in which case the corresponding portion of hepatic tissue is entirely replaced by the new growth. The masses are circular in outline, of a yellow or pinkish-white colour, of soft consistence, and are often more or less depressed in the centre. They may be limited in number, or may be very numerous. Their structure microscopically is that usually met with in cancer, and especially that observed in the so-called "encephaloid" variety of the disease.

In cases more rarely observed, cancer of the liver assumes the form of a general diffusion of the disease.

In these infiltrating cases the liver is enlarged, but there is an entire absence of those prominences which are so important a feature in the form of the malady usually met with.

Sarcoma of the liver also occurs, and lympho-sarcomatous growths may affect the organ.

It has been already mentioned that hepatic cancer is a secondary disease; the mode of transmission is doubtless that the cells of the growth are conveyed by the blood current. We have lately seen a case in which the left lung was the seat of cancerous growth; the disease was transmitted through the diaphragm, and involved nearly the whole of the left lobe of the liver, but no other part of the organ.

Treatment should be directed to the support of the strength of the patient, and to the relief of pain. To attain the latter object, it will not seldom be necessary to make frequent use of morphia hypodermically. Treatment.

Operative measures undertaken for the removal of the new growth are certain to end, in all cases, in complete failure.

V. DISEASES OF THE PANCREAS

DISEASES OF THE PANCREAS

It will not be necessary to devote much space to the consideration of the diseases of this organ. When it is remembered that the situation of the pancreas is particularly inaccessible, and that physical examination of the gland is almost impossible, and further, that the symptoms to which its diseases give rise are in no case characteristic, it will be readily understood that accurate diagnosis with regard to the maladies which affect the pancreas is impracticable.

The direct difficulties being so great in determining the pathological changes in the organ, it has been thought that information regarding the condition of the gland might be obtained from an examination of the fæces and the urine. For it has been assumed that marked changes in the structure and secretory activity of the gland would be attended with notable modifications of the digestive process. This is, however, also proved to be an erroneous assumption. Although the functions of the pancreas are well known, and the part it plays in digestion fairly understood, yet it cannot be said that the alterations of function involved through organic disease of the gland reveal themselves by any definite and invariable changes in the appearance and properties of the fæces and urine. It is true that very rarely marked abnormality of the fæces has been observed in cases of pancreatic disease; for instance, an altered appearance due to the presence of the unassimilated fatty portions of the food, giving rise to the production of a layer of creamy-looking fat on the surface of the evacuations. But in the great majority of cases of pancreatic disease, including malignant growth in the organ, nothing of the kind is noticed.

As is well-known, a certain form of saccharine diabetes is due to disease of the pancreas ; but it does not follow that lesion of the latter is always accompanied with diabetic symptoms. From these considerations it will be evident that, at the present time, it is not possible to describe the various signs and symptoms of pancreatic diseases, and we shall content ourselves with mentioning some of the chief morbid conditions of the organ, with any remarks thereon which may be necessary.

Acute and chronic inflammation occur, but present no characteristic symptoms. It is practically impossible, from symptoms alone, to differentiate between these affections of the pancreas and the far more commonly observed maladies of the stomach and liver, whose symptoms are simulated by those of the pancreatic affection.

Of more practical importance is cancer of the pancreas. This may be primary or secondary. It is generally of the scirrhus variety, and arises usually in the head of the organ. From the encroachment and pressure of the head of the pancreas upon the duodenum, it is not unusual for jaundice to be a symptom in this disease, the common bile duct being compressed at its entrance into the intestine. The malady is usually secondary, and consecutive to malignant disease of the stomach, peritoneum, or neighbouring organs. If it originates primarily in the pancreas, unless a tumour forms, it is impossible to diagnose the affection with certainty ; and even if a tumour exists, it is exceedingly likely to be mistaken for malignant disease of the stomach or great omentum.

Calculus of the pancreas also occurs, but cannot be recognised during life. The calculus is usually found in the duct of Wirsung. Cysts are sometimes met with in the organ, and may be due to the blocking of the duct by a calculus, or by a swelling of its mucous membrane, which may be secondary to an intestinal catarrh. Some cysts seem to have been the result of injury. Cases are recorded in which cyst of the pancreas has given rise to a large

tumour, presenting between the transverse colon and the stomach, which is dull on percussion. It need scarcely be said that the diagnosis of such a condition is extremely difficult, as the case is almost certain to be confused with malignant disease of the peritoneum, pancreas, or other organ, or with an ovarian or renal tumour of some kind.

The symptoms of the disease, as in all other affections of the pancreas, are extremely indefinite, and are generally entirely inconclusive as to the nature of the malady.

There is really nothing to be said concerning the treatment of a class of diseases the diagnosis of which is so extremely uncertain as are those of the pancreas. When the disease of the organ *can* be diagnosed, it is usually complicated with some other serious affection of the neighbouring structures, and in such cases the treatment is that of the primary lesion. In most instances only the general condition can be dealt with.

DIVISION V
DISEASES OF THE KIDNEYS

DISEASES OF THE KIDNEYS

GENERAL REMARKS—URÆMIA

OF all the diseases to which the human body is liable, none are more common than those of the kidneys; indeed, next to phthisis, it may safely be asserted that renal disease is the malady most often met with in this country.

When the important functions which the kidney fulfils are borne in mind, it will be obvious how very serious any disease affecting this organ must be.

The nitrogenous waste, the result of the metabolic activity of the tissues, is eliminated in the form of urea and other allied substances almost entirely by the kidney, and the retention of these waste products in the blood, which must arise when the depurative function of the renal organ is impaired in consequence of disease, gives rise to those symptoms which characterise what is known as the uræmic condition.

Much difference of opinion has existed, and still exists, as to the exact causation of uræmia, but for practical purposes it may be regarded as due to the retention of products of retrograde metamorphosis which should normally be eliminated by the kidney.

The symptoms of uræmia are many and various. In their mildest form they may be by no means characteristic—headache, pains in the limbs, diarrhoea; but when fully developed, these symptoms are too marked to be mistaken.

The most characteristic form in which symptoms of this nature present themselves is that of *uræmic convulsions*, in which a series of epileptiform attacks occur, the patient

remaining in a state of more or less profound unconsciousness during their continuance. Such attacks may be ushered in by the slight symptoms already mentioned, and, in addition, twitching of muscles may herald the approach of the seizures.

Uræmic convulsions are always of extreme gravity, and very often indeed consciousness is not recovered, death speedily ensuing. In other cases the patient may again become conscious, but hemiplegia may be found to have followed the attack of convulsions. Sooner or later, under any circumstances, a recurrence of the uræmic seizure is practically certain, inasmuch as the damage to the kidney upon which it depends is, in the nature of things, irremediable.

The quantity of urine passed is often, but by no means always, greatly diminished when uræmia threatens, and the breath under the same circumstances frequently acquires a disagreeable urinous odour. The treatment of uræmic convulsions is discussed in the article devoted to the consideration of chronic nephritis.

It is of the utmost importance that the possibility of the presence of renal disease be never forgotten. The symptoms of the malady in the earlier stages are often slight, and resemble those of some trifling illness. The only way to avoid mistakes of diagnosis is to make it a rule that in every case an examination of the urine be made. If this be done, it will not seldom be found that evidence of renal disease exists when totally unsuspected, both by practitioner and patient.

The diagnosis of renal calculus, of tubercular disease of the kidney, and of many cases of hæmaturia, is often extremely difficult, or indeed impossible.

Of late years it has become more and more usual to employ the cystoscope as an aid in determining the exact nature of the disease which may be present.

There can be no doubt that the use of this instrument, particularly in obscure cases of hæmaturia, may be of the

greatest service, as by its means the orifice of the ureters in the bladder can be carefully observed, and the exact source of the hæmorrhage may, in many cases, thus be determined. Some assistance, too, may, in difficult cases, be derived from the employment of the Röntgen rays.

It is, therefore, important that a knowledge of the principles and modes of application of both these methods should be as widely spread as possible, and it is to be hoped that proper facilities may soon be afforded for the study of these means of unravelling the significance of symptoms the interpretation of which is otherwise ambiguous or altogether impossible.

URINE, AND ITS ABNORMALITIES

HEALTHY urine is a clear amber-coloured fluid, of acid reaction, and of specific gravity of about 1.020. The quantity yielded in twenty-four hours varies greatly ; it may roughly be said to be two or three pints. Not only are great variations in quantity compatible with perfect health, but also the colour and specific gravity may vary within the same limits of sound health. After the ingestion of large quantities of fluid, for instance, the specific gravity falls and the quantity greatly increases. It is only when variations of quantity and specific gravity become permanent that morbid conditions can be said to exist.

The degree of acidity of the urine varies considerably ; it is always most marked on rising in the morning, and least after a full meal, in normal conditions. In other words, when the stomach is active and secreting gastric juice freely, the urine shows the minimum of acidity, and *vice versa*.

The colour of the urine is subject to many variations. As a rule, the more concentrated the fluid the deeper the colour. It has a more or less characteristic faint odour. Certain articles of diet give the urine a peculiar and distinctive odour, *e.g.*, asparagus.

The chief constituent of urine is urea ($\text{C.O.N.}^2 \text{H.}^4$), which is discharged approximately to the extent of 500 grains per diem. Uric acid occurs in the form of urates, and is eliminated to the amount of 10 to 12 grains per diem. Other substances discharged in the urine in small quantities are creatin, creatinin, and hippuric acid. Salts of lime, soda, and potash are present, phosphates chiefly, but chlorides and sulphates of the same bases are also found.

The acidity of the urine is not due to the presence of free acid, but to that of the acid phosphate of soda ($\text{Na H}^2 \text{P.O.}^4$); the other phosphates are kept in solution owing to this acidity. Should, however, the basic phosphate of soda ($\text{Na}^2 \text{P.O.}^4$) be formed, the earthy phosphates are precipitated.

When kept for twenty-four hours or longer, uric acid is thrown down in healthy urine, and decomposition commences. This decomposition is due to the previous acidity giving way to alkalinity, owing to the change of urea into carbonate of ammonia ($\text{C.O.N.}^2\text{H.}^4 + 2\text{H.}^2\text{O} = (\text{N.H.}^4)^2\text{C.O.}^3$); in other words, volatile alkali is developed. The urine is no longer clear, but turbid; it becomes very offensive, and numerous micro-organisms are met with in it, to whose presence probably the resulting change is due. This alteration in the reaction of the urine may occur in the bladder in connection with disease of the urinary passages, and is a result (and also a cause) of cystitis.

In morbid conditions of the general system the urine undergoes alterations in appearance and also in constitution. For instance, in fever it becomes scanty and concentrated, and may contain albumen in small quantity. In diabetes, the quantity is greatly increased, and large amounts of glucose ($\text{C.}^6 \text{H.}^{12} \text{O.}^6$) are contained in it. But it is in disease of the kidney itself that the changes in the urine become very distinctive, and of the greatest importance, both in diagnosis and treatment. Of some value also is the estimation of the quantity of urea which is passed in twenty-four hours.

The following are the tests for the morbid conditions of the urine usually met with:—

Urates.—Urine containing urates becomes turbid on standing, though quite clear when passed. This depends upon the insolubility of the urates in cold urine. It is quite common to find urine, clear when passed overnight, full of a thick cloud of urates on the following morning. Urates have a great attraction for the

colouring matter of the urine, and hence are of a red or pinkish tint; they possess also a tendency to adhere to the bottom of the vessel containing them. When heated, every trace of cloudiness speedily passes away, but returns when the urine again cools. The significance of urates in the urine is extremely slight. They occur in trivial ailments, such as catarrh, chill, or digestive disturbance. When the urine is scanty and concentrated, urates are nearly always present, as in the sparse urine of dilated heart.

Phosphates.—When the urine is but faintly acid, or slightly alkaline, a white precipitate forms on boiling. This is due to the precipitation of phosphates. The addition of acetic acid, or of a single drop of nitric acid, at once causes the cloud to disappear. In some cases of debility and nervous disturbance the urine is quite milky in appearance when passed; this is due to the presence of phosphates, and the addition of nitric acid causes every trace of milkiness to vanish. Phosphates are amorphous or crystalline; the latter are often arranged in tufts and stars of phosphate of lime. When, from the decomposition of urea, carbonate of ammonia is formed, and thus the alkalinity of the urine is due to volatile alkali, phosphates are always present. They occur in the form of the triple phosphate of ammonia and magnesia, and the crystals are easily recognised from their large size, shining surface, and coffin shape. Phosphaturia, not due to alkaline changes resulting from decomposition, is not usually a serious ailment. It is generally associated with neurasthenic conditions, and the treatment is that of the debility upon which it depends. Far otherwise is it with the phosphaturia associated with the presence of carbonate of ammonia. This is a most serious condition, often depending upon calculus or other surgical affection. In such cases the prognosis is always grave.

Uric Acid.—As already mentioned, this acid is thrown down in normal urine after standing a day or two. But it may be passed with the urine, either as small calculi or

as so-called "sand"; or, again, it may be deposited immediately after the urine is passed. When occurring only some hours after standing, the presence of uric acid is comparatively unimportant; but when passed with the urine, or deposited directly after it is voided, the condition is a serious one. Under such circumstances, it is obvious that calculus of uric acid may form within the body either in the kidneys, ureters, or bladder, with all the dangers attendant upon such deposit.

In febrile conditions the acid is passed in increased quantity, and crystals of uric acid are practically never absent from the urine of children suffering from scarlet fever.

To the naked eye the deposit shows itself in the form of dark red granules, both in size and colour greatly resembling grains of cayenne pepper. Microscopically, the crystals of uric acid show a great variety of forms, but they can always be recognised by their brown colour. These crystals often occur in the urine of gouty subjects.

Urea.—In diseases associated with increased metabolism the quantity of urea is naturally increased. Thus in fever the amount of urea passed may be greatly in excess of the average. It is usually increased, too, in diabetes mellitus, and in some other wasting diseases. On the other hand, in disease of the kidney the quantity of urea is often much below the normal. In the estimation of the quantity of urea, care must be taken that the urine tested be a specimen of the whole bulk of fluid passed in the twenty-four hours.

Several processes are in use for the determination of the quantity of urea; they depend upon the estimation of the nitrogen set free by the action of hypobromite of soda upon the urea. The small apparatus of Doremus is very useful for clinical work.

When in excess urea will, when the urine is in contact with cold nitric acid in a test tube, sometimes form a precipitate at the junction of the acid and the urine. This

precipitate consists of nitrate of urea, and by a careless observer such an appearance may be attributed to the presence of albumen in the urine; but the slightest attention will show the crystalline structure of the deposit; and further, on gently heating it will entirely disappear.

Oxalates.—Oxalic acid is present in urine in the form of oxalate of lime. The quantity of acid in the urine is increased by the ingestion of aliments containing it, and there is reason also to believe that to some extent its appearance in the urine varies with the amount of lime taken into the system. Oxalic acid has a tendency to form calculi in the urinary passages, and these deposits are specially characterised by the roughness of their surface. They form the so-called *mulberry* calculi.

Oxalates, when deposited in the urine, often have the appearance of mucus, being, as it were, suspended in the form of a cloud. Under the microscope they appear as very small shining crystals, having a shape resembling that of a folded envelope. They may also occur as dumb-bell-shaped crystals of larger size. Oxaluria is often associated with the train of symptoms met with in neurasthenic conditions. Thus depression of spirits and a hypochondriacal tendency are frequently observed. It is not unusual to find spermatozoa in combination with crystals of oxalate of lime, and this association is undoubtedly suggestive of sexual debility and bad habits, which are not seldom present in these cases, and, indeed, are probably the cause of the neurasthenic condition, of which the oxaluria is merely a physical sign.

Cystin is of very rare occurrence in the urine. It is occasionally deposited in the form of hexagonal crystals. When passed, the urine is generally thick, and a visible deposit occurs. When ammonia is added to the deposit, it immediately dissolves; and if the solution is evaporated, characteristic crystals of cystin are produced. No special form of ailment is associated with this rare condition of the urine.

Leucin and *Tyrosine* are extremely rare deposits, and are chiefly of importance as occurring in the urine of patients suffering from acute yellow atrophy of the liver. These matters are met with in the form of clusters of acicular fine crystals, of a yellowish colour.

Glucose, or Grape Sugar ($C^6 H^{12} O^6$).—Healthy urine contains grape sugar, but in the most minute traces only. In saccharine diabetes the quantity is enormously increased, and the specific gravity of the urine may, in consequence, be raised to 1.035 or over.

Not every case in which the urine contains considerable quantities of sugar is to be regarded as diabetes. In stout, middle-aged people, and in those with gouty tendencies, it is by no means unusual for small quantities of grape sugar to be present in the urine from time to time, especially when the diet is too rich in saccharine or amylaceous matters. Such cases are best described by the term *glycosuria*, the term *diabetes mellitus* being reserved for those in which not only is sugar found in the urine, but, in addition, wasting, thirst, and increased appetite are present.

The test for sugar depends upon the power of glucose to reduce the black oxide of copper to the yellowish-red sub-oxide. Fehling's modification of Trommer's test is the one now usually employed. The alkaline solution (potash) and the sulphate of copper solution are generally kept in separate bottles; but it is more convenient to employ one solution only, and Fehling's solution, prepared so as to be contained in a single bottle, is quite satisfactory in its action.

Moore's test is also useful for detecting the presence of glucose, and is applied by boiling equal quantities of the suspected urine and of liquor potassæ. If sugar is present, the boiled fluid acquires a dark-brown colour. The phenyl-hydrazin is a delicate test for the presence of sugar, and is effected by adding acetate of soda to phenyl-hydrazin hydrochlorate in a test tube, half filling the latter with urine, and boiling. On standing a deposit

forms, which, on microscopic examination, is found to consist of sulphur-coloured needles arranged in tufts.

Picric acid solution, when boiled with urine containing glucose, and the solution treated with liquor potassæ, develops a very dark-red or a mahogany colour which is characteristic.

In the quantitative estimation of sugar several methods are available. One of the simplest consists in adding a piece of yeast to the urine, whose specific gravity has been previously taken. After standing twenty-four hours, the specific gravity of the fluid is again estimated. The amount of sugar in grains per ounce will be equal to the difference between the readings thus obtained. It is scarcely necessary to say that this is a rough-and-ready method, and for accurate observation, titration with a standard (Fehling's) solution must be employed.

Mucus.—Normal urine contains a certain quantity of mucus; but when in excess, it forms a thin, filmy cloud suspended in the upper part of the fluid. Cold nitric acid sometimes causes the formation of a cloud in clear urine which is due to mucin. In this case the cloud forms from the surface downwards, whereas, in the case of albumen, the cloud first appears at the junction of the acid and urine, and thence extends upwards. Excess of mucus occurs in catarrhal conditions of the passage. It is particularly liable to be present in the urine of females.

Pus.—Urine containing pus may be acid or alkaline in reaction to test paper. Frequently, however, when pus is present the urine is ammoniacal. The presence of pus is manifested by a turbid, thick deposit, which, under the microscope, shows the characteristic corpuscles. If liquor potassæ be added to urine containing pus, and the whole be shaken, a sticky, glutinous mass results, which can be drawn out into long strings on pouring the urine from test tube to test tube.

The significance of pus is not always serious; it may be due to transient inflammatory conditions of the passages,

but very often it indicates suppuration of the kidney, ureter, or bladder, or perhaps an abscess connected with the urinary tract, all of which conditions are of grave import. Again, the presence of pus may be caused by the irritation of the mucous membrane of the bladder or urethra by oxaluria, or by the presence of uric acid crystals; but here, again, the pyuria is transitory. If it persists there is clearly some more serious cause for the condition. Pus does not disappear on boiling, and the transition from mucus to pus is quite imperceptible.

Blood in the urine may be due to a great variety of causes. It may depend upon general conditions, *e.g.*, scorbutus; or it may occur in tropical fevers, *e.g.*, "black-water fever" of the West Coast of Africa. Hæmaturia is very often due to inflammation of the kidneys; it may arise from a lesion of any portion of the urinary tract; it may be due to injury, to hæmorrhages from new growths in the kidneys, or urinary tract, or calculi of the same.

The colour of the urine in hæmaturia varies from deep red, or black, to a slight brownish coloration to which the term "smoky" is applied. As a rule, much information as to the origin of the blood may be derived from a careful inspection of the urine. When the blood is intimately mixed with the fluid, producing that condition to which the term "smoky" is applied, the chances are that it comes from the kidneys, or that it originates high up in the passages. On the other hand, when the two fluids are not intimately mixed, but more or less distinct, then the evidence is in favour of the hæmorrhage arising from the bladder or urethra. In the latter case also, the blood does not usually attend the stream of urine, but occurs apart altogether from micturition. When the bleeding appears directly after micturition, the hæmorrhage often originates in the bladder.

Detection of blood in urine is easy. When it is present in large quantity, the colour alone is almost sufficient for its recognition. In smaller amounts it may be detected by

a practised eye only. A mixture of tincture of guaiacum and ozonic ether gives a characteristic blue coloration in the presence of a small quantity of blood or blood-containing liquid. A few drops of the tincture are added to a little ozonic ether, and the suspected fluid is then mixed with the other ingredient in a test tube. Time must be allowed for the appearance of the blue tint, for when the quantity of blood is small, some minutes may be required for its production.

The microscope affords a ready means for the detection of blood. The red corpuscles are easily recognised; usually they are found to be swollen, rounded, and crenated at the margins. These appearances are always present when the blood has been some time mixed with the urine.

The spectroscopic appearances are extremely distinct and conclusive. A pocket spectroscope will answer every purpose for clinical work. When held between the slit of the spectroscope and the light, the fluid containing the blood being in an ordinary test tube, it will be found that the liquid gives two very clearly-defined dark bands between the lines D and E of the solar spectrum. This is the spectrum of oxy-hæmoglobin. If now a small quantity of sulphide of ammonium be added to the liquid in the test tube, and the latter well shaken, a single very dark band appears between the other two bands, which gradually reappear, whilst the single band vanishes. The single band is the spectrum of reduced hæmoglobin, and, as this again becomes oxidised from the air, the appearance of the oxy-hæmoglobin bands replaces it.

Casts.—In connection with the subject of hæmaturia, the presence of casts in the urine naturally presents itself for discussion. For practical purposes, it may be said that casts are composed of a material poured into the renal tubules, which, owing to its plastic nature, adapts itself to the conformation of the tubule into which it enters. The cast thus represents the interior of the tubule, and very often the epithelium lining the same is detached from its

sides. It will be seen that the nature and appearance of casts will thus vary greatly according to the nature of the plastic matter which forms their basis, and according also to the nature of the epithelium which adheres to their surface. In acute inflammation of the kidney, blood is often poured out into the tubules, and the casts are covered with blood corpuscles. Such are known as *blood casts*.

Other varieties of casts are recognised from the nature of the plastic substance. If the latter is transparent, clear, and structureless, the casts are *hyaline*. If the same substance is *granular*, that term is applied to the cast. If fatty degeneration has occurred, the cast is known as *fatty*. In lardaceous disease of the kidney, the casts may present the features associated with the amyloid change, and the casts are then known as *amyloid*.

Again, casts may be classified according to their size—small or large—which varies with that of the tubules in which they originate, or according to the character of the epithelium which covers them, *e.g.*, fatty, granular, etc. If the epithelium appears to be normal, they are simply described as *epithelial* casts.

There is no greater error than to suppose that the nature of the cast is a guide to that of the renal disease from which the patient is suffering. Casts, when present, are a strong corroborative proof of renal mischief; and when they are those of blood it is a fair inference that the disease is acute. But beyond this it is impossible to generalise. To speak of granular casts in the urine as being evidence of the presence of “granular kidney” is most incorrect. In acute renal disease, casts bearing all the characters of chronic lesions may be found, and *vice versa*. It must not be forgotten, too, that casts may be found in cases in which no renal disease is present; for instance, in cases of *morbus cordis* in which compensation is lost, it is not at all unusual to meet with granular casts. In such conditions, inflammation of the kidney is not, and never has been, present. The casts are due solely to

chronic stasis in the kidney, itself caused by cardiac failure.

Casts are probably formed from blood serum, and it must be remembered that those in the urine are by no means all—many more remain in the kidney.

Albuminuria.—The appearance in the urine of serum albumen has till lately been regarded as pathological under all circumstances, and in whatever quantity. The last few years have seen a considerable change of opinion on this subject, and at the present moment authorities are by no means agreed as to the exact significance to be attached to certain forms of albuminuria.

In most cases there can be no doubt at all that the condition is abnormal, and associated with disease of the kidneys. In such the presence of casts, in addition to the albumen, of hypertrophy of the left ventricle, together with a hard, incompressible radial pulse, render it certain that organic disease of the kidneys is present.

There has been a tendency sometimes to regard the significance of albuminuria as varying with the *quantity* of albumen present. This is a complete mistake. In one of the most hopeless of all renal lesions—granular kidney—albumen is often to be detected only as a slight trace, and it may be entirely absent. Speaking generally, however, there is practically but little difficulty in recognising the form of albuminuria which is associated with renal disease.

It is otherwise with patients in whom albuminuria is found, and in whom both the history and condition of the heart and vessels exclude the presence of renal inflammation. Most of these cases occur in young men of fourteen or fifteen to twenty-five or thirty; and unless the urine is examined as a matter of routine, it is extremely probable that the albuminuria will pass undetected.

Several different views are held with regard to this form of albuminuria. That in many cases it is due to exposure, causing chilling of the surface, as from open-air bathing, is

certain. When thus caused, the albumen disappears a few hours after the cessation of the exposure to which it is due. Other cases have been attributed to the escape of seminal or prostatic fluid in connection with bad habits. If albuminuria occurs at all under such conditions, it must be decidedly rare, and the other aspects of the case would certainly lead to suspicion of the probable cause. Albuminuria of this temporary character has, again, been described as arising in connection with over-exertion, or with the ingestion of certain kinds of food. All these varieties have been classified as cases of "functional" albuminuria, *i.e.*, those in which no organic disease of the kidney is present.

In cases of life assurance, it will be readily understood that in this matter a very serious responsibility is placed upon the medical adviser, and it is not easy to avoid injustice either to the office or the candidate. There can be no doubt that an albuminuria not associated with renal disease really does occur, but it must only be diagnosed after the fullest possible consideration of the case from all points of view, and after a most careful examination of the organs, as well as of the urine, has been effected. The latter must, of course, include a microscopical examination for casts.

We are inclined to suspect any case of albuminuria in which chilling of the surface cannot be clearly made out to be the cause. There is one practical point in these obscure cases which should never be lost sight of. The patient, unknown to himself, may be suffering from a very slight gleet, due to the presence of a small discharging, roughened patch in the urethral mucous membrane. Under these circumstances the urine may be clear and yet with the usual tests may show the presence of albumen. We have seen cases of this description in which error might very easily have been fallen into.

In discussing this subject we have made no reference to other forms of albuminuria, concerning the interpretation of which no doubt is likely to arise. We refer to the

albuminuria of fever, and to that due to stasis in the kidney from cardiac affections. With high temperature, no matter what may be the cause of the fever, albumen is quite usually found in the urine. When the temperature falls the albumen disappears, being merely the result of stasis due to the pyrexia. In the later stages of valvular heart disease, when compensation is lost, albumen also appears in the urine. In this case it persists, and indeed tends to become more marked as the engorgement of the kidney increases. In such cases, allusion to which has already been made, it is not at all unusual to find granular and hyaline casts in the urine.

Certain fevers, especially scarlet fever and diphtheria, are very often indeed associated with inflammation of the kidney. Then not merely albumen, but also blood, is frequently found in the urine. For some obscure reason the poison of these maladies has a special predilection for the kidney. It may be that the renal organ is the eliminating agent of the specific poison, and in performing this depurative function itself tends to become inflamed.

It is scarcely necessary to say that when blood is present in urine, the latter invariably contains albumen.

The detection of serum albumen in the urine is easy. Nevertheless, the testing of the urine for albumen is a subject which has been overloaded with details and different methods; to such an extent, indeed, that doubt and confusion as to the most satisfactory procedure are apt to arise. The number of agents and methods suggested is very great; but of the really practical processes only three need be referred to.

Undoubtedly, cold nitric acid is by far the most satisfactory agent to employ. A small quantity of the acid should be poured into a test tube, and then, with the tube as nearly horizontal as possible, the urine should be gently added, so that the two fluids touch without mixing. Should albumen be present a cloud forms, from below upwards, just at the junction of the urine and acid. The

cloud will, of course, vary in density with the quantity of albumen present.

There is no more delicate test than this, and were it not for the refractory nature of nitric acid as regards carriage, it would be a perfect test.

Next in order of merit is the process of boiling the urine in a test tube, with the subsequent addition of a drop of nitric acid. The cloud caused by boiling, if due to the presence of albumen, is not dispersed by the acid. Should the opacity be due to phosphates, it will disappear instantly upon the addition of the acid. Care must be taken to ensure that the urine is sufficiently acid before it is boiled, and yet not too much so; for in case the acidity is too slight or too great, albumen, though present, may not be precipitated.

If the acidity is slight, the addition of a drop or two of acetic acid will render it sufficiently acid to ensure the precipitation of albumen, if present.

Lastly, a saturated solution of picric acid is a valuable agent for the detection of albumen. But it has one signal drawback: it also precipitates peptones, which is not the case with nitric acid.

The fallacies connected with the use of nitric acid as a test for albumen are few, and have been already referred to under their respective heads. They may advantageously be recapitulated here. Mucin will give a cloud with cold nitric acid. It begins from *above* and spreads *downwards*—the very reverse is the case with the cloud due to the coagulation of albumen.

Nitrate of urea may form at the junction of the two fluids; it is crystalline, and disappears on the application of gentle heat.

A cloud of urates may be formed, but it also disappears on heating; and, further, only comes down when the urine has cooled.

Lastly, certain drugs, such as copaiva or sandal-wood oil, will cause a cloud with cold nitric acid. The history of the

case and the characteristic odour of the urine will prevent the possibility of error.

Occasionally the point of contact between the nitric acid and the urine becomes the seat of a more or less dark pigmentation, which is in some cases of a purple tint. This phenomenon is due to the action of the acid upon the colouring matters of the urine. But little is really known concerning the nature and significance of these colouring matters; the most important of these substances appears to be *urobilin*, but much difference of opinion exists as to the origin of this compound.

Urine, when boiled with hydrochloric acid, will often undergo a considerable darkening of tint. If chloroform is subsequently added, the colouring matters may be extracted. An important constituent of these colouring matters is *indol*, the amount of which is certainly increased in chronic constipation, giving the urine a very dark colour when boiled with hydrochloric acid, and subsequently treated in the manner just described.

In cases of jaundice the urine is deeply bile-stained; it may be of a dark-brown colour, or nearly black.

The test known as Gmelin's is that by which the presence of bile pigments is detected. When portions of urine and of strong nitric acid are placed upon a white plate and are allowed to touch each other, at the point of contact a series of colour changes is observed, the tints successively presented being often blue, violet, and red.

Rosenbach's modification of the proceeding is often more satisfactory than the original test. The urine is filtered, and some drops of a mixture of nitric and nitrous acids are added to the filtrate. In this way the coloured ring is rendered more obvious.

Pettenkofer's test for bile acids consists in the production of a violet colour when the bile containing urine is mixed with a solution of cane sugar, to which a small quantity of sulphuric acid has been added.

INCONTINENCE OF URINE

INABILITY to retain the contents of the bladder is a symptom not uncommonly observed in the diseases of the brain and spinal cord, and is, of course, frequently met with in surgical diseases affecting the lower urinary passages.

In febrile conditions, too, when the temperature is high and the intelligence blunted, incontinence of urine and fæces is constantly noticed. The urine may also be passed involuntarily during an epileptic attack.

None of these different forms of incontinence come within the scope of the present description, which is limited to that of the form of the malady confined to children and young people generally.

Until the age of eighteen months or two years the control of the sphincters is conspicuous by its absence, but in a normal child at or about the age mentioned a request should be made for the means of passing water. In other words, a reluctance is at this age usually shown by the child to wetting itself. By night, however, the urine may still be passed involuntarily during sleep, and this in perfectly normal children. But this tendency to wet the bed should also cease of itself towards the age of three or four, and from this time onwards should never recur.

In many children the habit of passing water during sleep, natural during infancy and early childhood, is never overcome, and night after night the same disagreeable wetting of the bed occurs, even until the age of twelve or fourteen. In some cases the unfortunate tendency may last even after the changes incident to puberty are established; and in very rare cases, seldom seen, the patient wets the bed even in adult life.

The determining factors in nocturnal incontinence are

numerous and complicated. In some, but certainly in but few, it may be the outcome of sheer laziness, the child being too idle or self-indulgent to take the trouble of rising to relieve the bladder. In many cases the custom of drinking freely at bed-time is responsible for the habit, especially in children who sleep very soundly. The condition of the urine, too, is an important factor.

In many cases this fluid is hyper-acid, concentrated and irritating; it then excites a reflex contraction of the bladder, which immediately empties itself, the patient being sound asleep. We are convinced that many cases of nocturnal incontinence own this origin, and it is not surprising when the well-known tendency to pass uric acid and urates on the part of children is borne in mind. That peripheral irritation will in some cases cause nocturnal enuresis is also very possible; such conditions as undue length or tightness of the foreskin, or those excited by the presence of oxyurides are certainly liable to lead to this troublesome complaint.

In rare cases it would seem that the malady is due to a weakness on the part of the nervous and muscular structures connected with the bladder, or with undue irritability of the same, which may possibly, in very rare instances, be connected with the habit of masturbation.

Sometimes the want of control is not confined to the hours of sleep. It may be that during the day also there is the same tendency to the involuntary discharge of urine. These cases are generally due to weakness of the sphincter, perhaps combined with too energetic propulsive power on the part of the muscular wall of the bladder.

It has been thought that sensitive, excitable, neurotic children are especially likely to be the victims of this unpleasant tendency. We are not by any means prepared to admit the validity of this view, for we have repeatedly noticed the same tendency in those children whose temperament was the exact opposite of that just referred to.

In any individual case, it is often most difficult to

determine the exact cause which is at work, and more than one influence may be present. Inquiries should be made with the view of detecting any irritation which may be present, *e.g.*, oxyurides, phimosis, bad habits. And in all cases the urine should be carefully examined, especially for hyper-acidity, or the presence of uric acid in excess. The question of the dietary of the child is also very important, and one which is intimately connected with the condition of the urine just alluded to. The time of night at which the accident happens, and the hour when fluid was last taken, together with the quantity of the same, are also important points in the history of the case.

Those cases in which the tendency persists until puberty, or afterwards, are always the most difficult to deal with; the habit may, of course, under these circumstances, be the result of imperfect mental development; but in many instances this is not so, the infirmity being met with in those of perfectly normal intelligence, and in spite of their most anxious desire for its cessation.

The treatment of incontinence of urine, using the term strictly in the sense defined above, is not by any means simple or satisfactory.

In spite of our utmost endeavours, there will always be a large percentage of cases in which the malady is most rebellious; but in the majority the trouble can be greatly alleviated, and in not a few entirely cured.

The first and most essential duty is to inquire into the dietary, the general health, and the condition of the urine. Probably all these points will be found in need of rectification. Acidity of urine must be lessened by the administration of citrate of potash, or acetate of the same base, and the utmost care must be observed to prohibit sweets and other matters which are prone to tend to undue acidity of the urine. Exercise in the open air must be enjoined, and the action of the bowels carefully regulated. Under no circumstances should the child be allowed to drink within two hours of going to bed, and care must be taken that the

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bladder is emptied the last thing before retiring. Further, the child should be waked up once during the night in order that he may pass water.

Great numbers of drugs have been recommended for the cure of this affection, a sure evidence that not one of them is really reliable. The drugs we have found most satisfactory are strychnine, belladonna, alkalies, liquid extract of *rhus aromatica*, and the liquid extract of ergot. These drugs may be combined in various ways, and must be continued for some time.

The extract of *rhus aromatica* is sometimes of the greatest service; particulars as to the value of the remedy will be found in a paper by Dr. Freyberger,¹ whose experience of the drug has been very favourable. The dose varies, according to age, from 5 to 30 minims, given three times a day.

In many cases of nocturnal incontinence, one drug after another must be tried, until some effect is obtained. As a general rule, if there is loss of control by day as well as by night, the administration of strychnine is desirable, and is often attended with marked improvement.

¹ *Treatment*, Vol. II., p. 129. The treatment of incontinence of urine in children with the liquid extract of *rhus aromatica*.

ACUTE NEPHRITIS

THIS malady is, as a rule, of abrupt onset, appearing often in the course of, or consecutive to, scarlet fever or diphtheria; but it may arise also in those apparently previously healthy.

The symptoms of acute nephritis are œdema, anæmia, Symptoms. hæmaturia. The earliest symptom that usually attracts attention is œdema, often in the first instance of the face, and especially round the eyes. The œdema may also occur in the soft palate, uvula and epiglottis. Soon the whole body may become œdematous, the swelling being especially marked in the penis and scrotum; the abdomen may be found filled with fluid. Pericarditis may supervene, or œdema of the lungs. The urine is scanty, and not more than a few drops may, in some cases, be passed in many hours. Hæmaturia is often present, and on standing the urine deposits a sediment which is found, on microscopical examination, to be rich in casts. Many of these are blood casts, but all kinds are present, epithelial, granular, and hyaline. Red blood corpuscles are also found, together with epithelial cells from the renal tubules. In children especially, crystals of uric acid are of very frequent occurrence, and are recognised by their brown colour. Oxalates are also commonly met with.

On boiling, the urine may be nearly solid with albumen; frequently one quarter to one half is deposited on standing after boiling. The symptoms of uræmia may be present at the outset of the malady, but this is seldom the case. In rare instances icterus is observed, and is of unfavourable omen. Nearly always anæmia is present, and when the disease has lasted any length of time, it may be marked. The

patient is generally very short of breath, and effusions into the pleural cavities are not uncommon. Convulsions of uræmic origin may be the very earliest indication of anything being wrong.

In children and young people especially, the heart very soon responds to the kidney lesion ; it enlarges, it may be by dilatation of all its cavities, or by hypertrophy and dilatation of the left ventricle only. It is not usual for the pulse at this stage to be of the characteristic renal quality, and if this should be the case, there is great reason to think that the patient is suffering from an acute attack, complicating chronic renal disease. In children, at all events, it is not the rule for the sphygmographic tracing to show a square summit at this period of the malady.

The sounds of the heart undergo modification, the first sound becomes dull and prolonged, the second sound accentuated over the aortic area. Epistaxis, sometimes profuse, may occur at this stage. Purpuric eruptions of measly aspect have been noticed. Acute pneumonia may also supervene. It nearly always ends in gangrene or suppuration of the lung, and is inevitably fatal. Bronchitis is often present. The bowels are generally confined ; but in some cases diarrhœa may be a prominent feature of the disease, and severe headache is often complained of. The temperature is generally normal, but occasionally is slightly raised. Gangrene of the penis or scrotum has been observed, but occurs only rarely.

Such are the ordinary symptoms of acute nephritis ; but when arising in children, the disease presents several peculiarities in its symptomatology in more than one respect. With regard to temperature, in young children and infants it is not uncommon to meet with considerable pyrexia, and possibly vomiting, which may be the chief symptoms of the disease. Such cases may be entirely mistaken unless the urine is examined as a matter of routine. Again, cases occur in which a child is found to be suffering from dyspnœa, and rapidity of heart action—it

may be that the pulse is two hundred or more—and the urine is found to contain but a small quantity of albumen. In such cases it is not uncommon to hear on auscultation rubbing and scraping sounds over the cardiac area, which may lead to the erroneous diagnosis of pericarditis. In reality, the whole of the symptoms are those of an acute nephritis. Further, in another class of case the œdema may be extreme and general, and yet no albumen may be found in the urine. But in such conditions the urine is generally scanty, and the œdema is probably due to its partial suppression. On the other hand, in cases of acute nephritis in children, œdema may be entirely absent, and sometimes the patient presents all the appearances of renal disease when no such malady is present.

When the patient is carefully treated, amendment generally ensues, dropsy subsides, blood disappears from the urine, the quantity of albumen diminishes, while that of the urine itself increases. But even in the most favourable cases there is a risk of chronic renal disease supervening; under any circumstances albumen in small quantity almost always persists in the urine for a long time, it may be for months.

But the patient may die of uræmia, and convulsions and coma may set in, with total suppression of urine. The chest complications may also at any time become threatening; pneumonia, or œdema of the lungs, may cut off the patient, or pleurisy and pericarditis may develop, and terminate fatally. Should the disease pass into a chronic phase, albumen persists in the urine, which is found to contain casts of all varieties, but chiefly those of blood, when an acute attack complicates the chronic affection. Slight œdema, especially of the eyelids in the morning, is observed; the patient is thin and anæmic, short of breath, incapable of exertion, and liable to severe headache. In such cases there is great tendency for the smallest exciting cause to induce an attack of acute nephritis, when all the symptoms detailed above may appear.

Affections of vision may occur in acute nephritis; amblyopia, and even complete blindness, which may, however, be temporary only, are to be met with occasionally. These defects of vision are due to hæmorrhages into the retina, or to retinitis. They are, however, far more frequent in chronic than in acute nephritis, and retinitis is almost confined to such chronic conditions of renal disease.

When acute nephritis passes into a chronic state, the patient, whether child or adult, is always in a very precarious condition. At any time some complication of the disease may develop, and death may ensue. The heart in the child, as already mentioned, very soon becomes enlarged in renal disease. But hypertrophy of the left ventricle under such circumstances is seldom very lasting or satisfactory. Thus death not infrequently results from secondary dilatation of the right heart. Uræmic convulsions are by no means an infrequent cause of death. The fatal event, again, may be due to defective nutrition arising from the constant drain of albumen through the kidneys.

Causation
and Morbid
Anatomy.

There can be no doubt that, in by far the larger number of cases, acute nephritis is caused by scarlatina or diphtheria, and much less often by other febrile diseases. Nevertheless, there is a minority of cases in which it is possible to exclude the occurrence of any of these affections. Not infrequently the most searching cross-examination of the friends, and the most scrupulous investigation of the patient (generally a child) for evidence of desquamation, give no support to the view of an antecedent attack of scarlet fever being the cause of the nephritis. When, however, the insidious course of scarlatina is borne in mind, the multiplicity of its manifestations, sometimes without rash, it is by no means certain that, after all, in doubtful cases scarlet fever may not be the real cause of the nephritis. We are strongly of opinion that, apart from the diseases mentioned, acute nephritis does not occur, except as an exacerbation of a chronic renal lesion.

It has been thought that exposure to cold will cause

acute renal inflammation, and certain cases appear to lend support to this view. Instances are recorded in which sudden immersion in a pond has been followed by nephritis; but unless the patient was previously known to be free from renal disease, this evidence is worthless. It is conceded by all that exposure to cold will light up acutely disease which has hitherto been chronic, but it is very doubtful whether any influence of the kind has a similar effect on a perfectly sound kidney. In all cases the closest examination of the whole body should be made for signs of desquamation, and it must not be forgotten that the hands and feet desquamate last. Attention has been already called to this point under the head of scarlet fever; it is reiterated here on account of its great importance. It should be added that in some cases the hands and feet are perfectly clear, while the head and trunk are still desquamating. This arises from carelessness in washing the patient, the hands and feet being attended to while the rest of the body is neglected.

In the early stages of acute nephritis the kidney is usually enlarged, the cortex swollen, the surface smooth, and the capsule easily separable. Very rarely, indeed, is the kidney on section found to be deeply engorged and dripping with blood. In most cases the cut surface is only moderately reddened, and the glomeruli may be obvious as red points. Points of hæmorrhage may also be observed in the cortex, and the redness of the section is most intense in the medulla. The hyperæmia is most marked round the glomeruli and the straight tubes.

As might be anticipated, the microscopical morbid appearances are especially marked in and around the Malpighian tufts. It is generally stated that the epithelium lining the glomeruli, and that covering the convoluted tubes, proliferates; it is certain that extravasation of leucocytes occurs, and that the glomerulus becomes surrounded by this extravasation. Thus the vessel becomes pressed upon; indeed, it is more or less constricted at the

neck, its function being thus very seriously interfered with. Exudation takes place into the renal tubules generally, with resulting detachment of epithelium, and blood may also pass into the tubules, with consequent formation of epithelial and blood casts, according to the nature of the effused fluid. The epithelial lining of the glomerulus swells and becomes detached.

In consequence of the very marked changes which occur in the glomeruli in scarlatinal nephritis, the term "glomerular nephritis" has been applied to the disease. But this condition is not confined to scarlet fever; it occurs in other forms of acute nephritis. The morbid changes, however, are by no means confined to the glomeruli, though most marked in them. Swelling occurs in the epithelium lining the uriniferous tubes, which may be so pronounced as entirely to occlude their lumen. Extravasation of leucocytes into the interstitial tissue of the organ also takes place, and this, by pressure, tends further to embarrass the circulation in the kidney. Hyaline degeneration may also be found in the glomerular vessels.

It must be borne in mind that very often in the most acute phases of renal inflammation in children the morbid changes, both to the naked eye and microscopically, are of the slightest, but under all circumstances are most marked in the neighbourhood of the glomeruli.

Treatment.

Confinement to bed is necessary. It is advisable to dispense with sheets, the patient lying between blankets alone. The chief indications for treatment are to endeavour to arouse and increase the action of the skin, and to keep the bowels freely open. The former object may be attained by the use of the warm bath, by the hot air bath, either of which may be given every night, or by the hot wet pack. The latter is prepared by wringing a blanket out of boiling water, letting it cool down to a bearable temperature, and then wrapping the patient in it up to the chin. Other blankets are then placed over this one, and the patient lies undisturbed for an hour. At the end of that time the

blankets are removed, and the skin is thoroughly dried. In some cases a continuous hot wet pack has been tried with satisfactory results, but there are certain risks attending both this mode of treatment and that by the hot air bath. There is a danger that if employed continuously the hot wet pack may lead to hyperpyrexia, and we have seen the use of the hot air bath followed shortly by cerebral hæmorrhage. On the whole, the ordinary warm bath is safer, and often sufficient for all purposes.

In all these different forms of treatment the greatest care must be taken to avoid the risk of chill during the various stages of the process.

The bowels must be kept freely open by the use of compound jalap powder, in appropriate doses. In cases in which uræmia threatens, croton oil, or elaterium, may be administered.

The subcutaneous injection of pilocarpine has been recommended. This proceeding is followed by profuse sweating and salivation, and frequently vomiting ensues. It is a question whether the discomfort and weakness thus induced are counterbalanced by corresponding advantage in the loss of fluid produced. It has always appeared to us that any benefit thus attained has been of the most temporary, indeed fugitive, character.

Internally, mixtures of citrate or acetate of potash, together with spirits of nitrous ether, may be given with decoction of scoparium. In some cases, small doses of spirits of juniper give good results. It is of some service to induce the patient to drink large quantities of water, or of barley water. Dry cupping over the loins may be tried, but its effects are very doubtful.

The diet in the acute stages of nephritis must be strictly regulated. It should be, as far as possible, restricted to milk and light puddings. Soda water may be allowed with the milk. As the acute symptoms subside, fish and fowl may be added to the dietary, but butcher's meat must be given sparingly. Some cases appear to do better with a

less rigorous diet ; but in all it is necessary to be careful both as to quantity and quality of food, the highly nitrogenous aliments being excluded. The greatest caution must be observed during convalescence with regard to chill. Flannel should be worn both summer and winter. A warm and dry climate during convalescence is most desirable.

CHRONIC NEPHRITIS

THE symptoms of chronic nephritis vary considerably, according to the inveteracy of the renal disease and to the nature of the histological element of the kidney which is chiefly affected. In recent cases, consecutive to acute disease, the symptoms do not differ greatly from those of acute nephritis already described ; namely, œdema, anæmia, shortness of breath, weakness, and alterations in quantity and quality of urine. Every gradation of symptoms may be observed, from those attending the comparatively acute disease just mentioned to those which accompany the so-called granular kidney, in which the œdema, when present, is slight and chiefly confined to the tissues surrounding the eyes, but in which cardiac and vascular changes assume the most pronounced form. Symptoms.

It must never be forgotten that in all cases of chronic nephritis a very slight cause may excite acute inflammation, which may be attended with all the symptoms of acute nephritis, even to the production of hæmaturia. Unless, therefore, the patient with apparent acute nephritis is a child, and unless there is reason to suspect an exciting cause, a seemingly acute renal inflammation must always be looked upon with suspicion. In adults it is almost invariably an acute attack developed upon chronic disease of the kidney. It is of vast importance to remember this point, as otherwise a far too favourable prognosis may be given.

Generally speaking, it may be said that chronic nephritis presents itself under two aspects. In one form there is œdema of the legs, scrotum, and penis, with anæmia and shortness of breath ; and in the other the patient complains

of symptoms which, at the first glance, do not appear to be connected with the kidney, but with some other organ. It may be the stomach and intestine which are affected, dyspepsia and diarrhœa being complained of; it may be the heart's action which is disordered; or faintness or shortness of breath may be present. Again, severe headache, and possibly impairment of vision, may be the chief troubles; but in most cases several of these symptoms are combined.

In the class of case in which œdema is a prominent symptom the urine will probably be found to be heavily charged with albumen and casts, whereas in the second group not more than a trace of albumen may be present, and merely a few granular and hyaline casts.

In general terms, the first class of case corresponds more or less accurately to the "mottled" kidney, which is not, however, a distinct pathological entity; and the latter group of symptoms, included in the second form, is characteristic of the "granular" kidney.

It must never be forgotten that the latter type of the disease may be, and often is, in children as well as in adults, the terminal phase of acute nephritis. But it may also creep on insidiously, never having been associated in any way with acute disease, but being chronic from the beginning.

In this form of renal disease there is often a marked connection with gout, and accordingly the lesion has been known as the "gouty" kidney. It has been mentioned that in this form of renal disease the heart and vessels are especially affected. The heart affection shows itself in a marked hypertrophy of the left ventricle, in a distinctly modified character of the first sound, which, in addition to the peculiarities characteristic of hypertrophy, is not seldom reduplicated. So definite and peculiar is this alteration of the first sound that the renal lesion may, in many cases, be diagnosed from it alone. The second sound also undergoes changes; it becomes very loud and ringing,

or, as it is termed, "accentuated." It is the aortic element of the second sound which contributes to this accentuation.

The pulse, in all forms of chronic renal disease, but especially in that variety known as the granular kidney, undergoes alterations which are perceptible to the finger applied to the radial artery. The pulse becomes markedly incompressible, so that much more force than usual is required to obliterate it. Tension in the vessel is raised, as may be rendered evident by the use of the sphygmograph, when the tracing will represent a curve with a very round summit. The walls of the vessels in granular kidney are not seldom degenerate, owing to atheroma, and as this change is universal, and particularly marked in the cerebral vessels, it is not surprising that a strong tendency to hæmorrhage into the brain exists.

Affections of vision may occur in any form of nephritis. They are by far most often observed in granular kidney. Two lesions are found—retinitis and hæmorrhage. Often they are combined. A hæmorrhage into the macula, of course, causes total blindness; short of this, much impairment of vision may result from scattered blood extravasation. The ophthalmoscopic appearances of the retinal changes in renal disease are very characteristic, and are fully described in the article devoted to the use of the ophthalmoscope.

Inflammation of serous membranes may occur in chronic nephritis; thus the pericardium and pleura may both be the seat of acute inflammation. Such complications are very serious, and, like pneumonia, nearly always end fatally.

Uræmic symptoms may appear in the form of twitching of muscles, sensory disturbances, and temporary loss of memory, or thickness of speech. In some cases of threatening uræmia the manner of the patient becomes dull, stupid, and occasionally almost idiotic. When convulsions occur, they differ in no respect from those characteristic of the

epileptic attack. They are often, however, more prolonged, and are known as "epileptiform" or "eclampsic" convulsions.

In the more chronic form of renal disease an increased frequency of micturition is a very usual symptom, and the patient, contrary to his previous habit, has to get up once or twice during the night in order to pass water. In the chronic form of the disease the quantity of the urine is increased, and the specific gravity low. In this form of the malady the amount of albumen may be considerable, but in the granular kidney it is often a mere trace, and it is very important to know that it may be entirely absent for long periods.

It is necessary to insist upon the fact that, in chronic nephritis, but little reliance can be placed upon the character of any casts found in the urine as a means of determining the pathological changes which are present in the renal organ. It was formerly thought that the presence of a preponderance of a definite kind of cast was a certain evidence of the existence of a distinct pathological condition of the kidney. For instance, the so-called "large white" kidney—a rare form of the disease—was thought to be present when an abundance of degenerate epithelial casts was found, and the granular kidney when the majority of casts were of the granular and hyaline variety. Such conclusions are most fallacious, and it may be said that any kind of cast may occur in any variety of chronic nephritis. All that is certain is that the presence of blood corpuscles and of blood casts indicates an acute affection, which, however, may be merely an exacerbation of a chronic disease. Further than this it is not safe to go, and the attempt to draw conclusions from the nature of the casts will end in failure if pushed. It is indeed no uncommon thing to find casts in the urine of chronic heart disease, when the kidneys are not, and never have been, inflamed, but are merely in a state of chronic congestion.

In lardaceous disease of the kidney the patient is usually

anæmic, and much œdema may be present. All the usual symptoms of sub-acute nephritis are observed. There is generally a considerable quantity of albumen in the urine, which may contain casts of all kinds, and occasionally those to which the term "lardaceous" may be applied, *i.e.*, they stain a mahogany brown colour with iodine and iodide of potassium solution.

In all cases of lardaceous renal disease a cause of the amyloid degeneration will be apparent; it may be bone disease, prolonged suppuration of any kind, or other lesion. It is very usual for lardaceous enlargement of the liver and spleen to co-exist with similar disease of the kidney.

The most usual cause of chronic nephritis is an acute attack of renal inflammation. In only too many instances, and in spite of the greatest precautions, the disease passes into a chronic phase. It is extremely probable that in many cases of scarlet fever the renal lesion is never detected; perhaps the attack of scarlatina itself is never diagnosed, and in this way cases of nephritis are frequently ascribed to "cold" and "chill," where, as a matter of fact, exposure has merely been the exciting cause of an acute inflammation in a chronically diseased organ. It is extremely doubtful if either acute or chronic renal disease can be caused by exposure when the kidney is previously sound.

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There can be little doubt that in gouty subjects a very insidious form of renal disease may occur; namely, that to which the term "granular" kidney is applied. Without any acute inflammation the organ may become slowly invaded by a new growth of fibrous tissue, with gradual destruction of its secreting elements, and at the same time with a great tendency to vascular degeneration. It must never be forgotten that granular kidney may also be the terminal phase of acute nephritis, and this in quite young children.

We have seen such a condition in a girl of twelve. The kidneys in this case weighed each about one ounce, were extremely rough, with strongly adherent capsule, and with

scarcely any cortex. The child was almost blind from albuminuric retinitis. The whole mischief was consecutive to an attack of scarlatina from which she had suffered some five or six years previously.

It will be necessary now to enter more in detail into the subject of the morbid anatomy of renal disease. It is usual to distinguish certain varieties of chronic nephritis, of which the most important types are the "large white" kidney, the "granular" kidney, and the "lardaceous" kidney.

The first is described as large, very pale on section, with increased size of the cortex, and easily detachable capsule, which is not usually thickened. In practice, however, it is by no means customary to meet with such a form of renal lesion. The kidney actually met with in cases of chronic nephritis, other than those of granular kidney, is far from presenting the characters above given. Frequently the organ is not greatly altered in size; the cortex may be normal in thickness, or at all events not markedly increased. The cut surface is generally of a more or less mottled appearance, fawn-coloured patches being scattered over a section which is generally made up to a greater or lesser extent of varying shades of red or brown. It is important to remember that all the histological elements are involved in the inflammatory process: vessels, epithelium, glomeruli and interstitial tissue. In the "mottled" kidney now under discussion, which is certainly by far the most usually met with at post-mortem examination of renal cases, the vascular and epithelial changes are more marked than those affecting the connective tissue of the organ. Glomerular changes, similar to those already described under acute nephritis, are present, and marked fatty and granular degenerations are observed in the epithelium lining the tubules. The connective tissue is infiltrated with leucocytes.

In the granular kidney the organ is greatly reduced in size, this reduction being specially marked in the cortex; the capsule is more or less thickened and adherent, and on forcible detachment portions of the cortex are carried away

with it, the surface of the latter being more or less finely granular, instead of smooth and shining. In this form of lesion the histological changes are most marked in the interstitial tissue, though all the structures of the organ are involved. The newly-formed connective tissue is found to pervade the whole renal structure, the result being the destruction and obliteration of the vessels and *tubuli uriniferi*. Cysts are frequently present, and are often found beneath the capsule. They contain clear fluid. The organ is extremely tough and resistant to pressure, owing to the great increase of connective tissue. It will be found that the fibrous tissue tends to project into the organ from the thickened capsule. Strands of new connective tissue will be observed to digitate in this manner, being always thick at the base, and thinning out as they spread through the renal structure. Marked degenerative changes are, as already mentioned, found in the epithelium lining the renal tubules and in the glomeruli.

It will thus be seen that in chronic nephritis there is no marked distinction, either macro- or microscopical, between the different forms of lesion which result. In the more acute stages there is a tendency to extravasation around the Malpighian tufts, and to swelling of the tubular epithelium; in the more chronic, to the development of interstitial connective tissue. But it is necessary to insist upon the fact that in every form of nephritis all the histological elements of the organ are more or less involved, and that the ultimate result of chronic inflammation here, as elsewhere, is to cause increase in the amount of the connective tissue element.

It must not be forgotten, too, that what we see at post-mortem examinations is only a phase in the degeneration of the organ—a phase which has been isolated, as it were, by the death of the patient. Had he lived, it is certain that further and marked alterations would have ensued, all of which changes eventuate ultimately in the extreme form of granular kidney. If it were possible—which it is

not, on account of the vital nature of the renal function—for the last phase of all to be reached, it cannot be doubted that the kidney would be represented by a mass of connective tissue.

It is very important to have clear and sound views on this matter, and more especially should the student be on his guard against assuming that “large white kidney,” “mottled kidney,” etc., represent pathological entities. They do not; they are merely stages in a degenerative inflammatory process.

In the lardaceous kidney the changes are usually marked. The organ is much enlarged, the cortex being especially increased in size. The capsule is not thickened, and separates easily. The section is smooth, pale, and waxy-looking. On the application to the cut surface of an aqueous solution of iodine with iodide of potassium, the affected areas stand out as points of a deep mahogany colour. The morbid change affects chiefly the vessels of the Malpighian tufts; their middle coat is first affected by the lardaceous deposit, which later involves the whole thickness of the arterial wall, the lumen of the vessel being in this manner much narrowed. It must be borne in mind that the lardaceous change is in all cases associated with other evidence of nephritis, and that the epithelium lining the tubules and the interstitial tissue are involved, as already described.

Fatty changes are frequently present, in association with other morbid conditions, and they may be so marked as to give the characteristic appearance to the affected organ. In this case the kidney is large, pale, with yellowish patches on the cut surface; it is soft, and may be greasy to the touch. Microscopically, the tubules and other structures, and especially the epithelium, are found to be the seat of fatty infiltration and degeneration.

There is a form of diseased kidney met with in cases of chronic heart disease, and due to the stasis thereby engendered. The renal organ is heavy, dense, tough, and leathery, and not unfrequently contains cysts. The morbid

condition is brought about by a chronic infiltration of a slowly-contracting, newly-developed connective tissue.

In the cases which are consecutive to the acute disease, and where the symptoms do not differ greatly from those of the latter malady, the treatment is practically the same as in acute nephritis. The patient should be kept in bed in a suitably warm room; the diet should be light, yet nutritious, and milk should be the staple article of food. The bowels must be kept freely open, and the skin maintained active by warm baths. Treatment.

It is a question in these cases whether a rigorous milk diet is as useful as was formerly supposed. We have repeatedly seen better results from the employment of a mixed dietary of milk, light puddings, fish, and fowl. Certainly, in the more chronic forms of the disease, many patients seem to do better when the severe restrictions formerly imposed as regards diet are removed. Butcher's-meat, however, should in all forms of chronic nephritis be used but sparingly, and in some cases forbidden entirely.

In the more chronic cases, and in granular kidney, the patient may be up and about. He should winter, if possible, in a warm and dry climate, such as that of Egypt. Always, even in summer, he should wear flannel, and should be most careful to avoid chills. Alcohol should not be taken, or in very small quantity only, and in the form of old whisky or brandy. Sometimes appetite is promoted by half an ounce with dinner, but this quantity should not be exceeded.

The perils which surround the victim of chronic nephritis are so numerous and deadly that it is impossible for him to be too careful of his health. Some cases appear to benefit by a long sea voyage.

If anæmia, as is often the case, is a prominent symptom, iron may be administered. The perchloride in moderate doses is one of the most suitable preparations, and may be administered in conjunction with solution of acetate of ammonia. The bowels should in all cases be kept in good

order. For this purpose the natural mineral waters, such as; Hunyadi-Janos, Friedrichshall, Æsculap, or other products of the German springs, are very suitable. The compound jalap powder is also an effective combination, but all strong purgatives should, as far as possible, be avoided.

The treatment of uræmic convulsions is unsatisfactory. Every effort must be made to arouse the action of the skin and bowels when convulsions threaten; when actually present, the treatment by venesection is one of the best that can be adopted, and chloroform may be inhaled with some benefit. Elaterium may be given, with the view of provoking profuse watery evacuations from the bowels.

PYELITIS

PYELITIS, or inflammation of the renal pelvis, often involving the pyramids and cortex, can scarcely be regarded as an independent malady. It is really an incident in the progress of other diseased processes affecting the kidneys, especially renal calculus and tuberculosis.

The symptoms of pyelitis, as will be gathered from what has just been said, are practically those of the condition on which it depends. One of the most usual causes of pyelitis is renal calculus, and in such cases the symptoms of the two affections are identical. It may be said, in general terms, that the symptoms of pyelitis are pain in the renal region, which may be paroxysmal and indistinguishable from renal colic, pus in the urine, which is nevertheless often acid in reaction, and possibly hæmaturia. A characteristic feature of the disease is the tendency in some cases for the previously purulent and possibly sanguineous urine to suddenly become clear, and to remain so for perhaps some days, after which the previous appearances return. When this occurs, it is due to the temporary plugging of the ureter of the diseased side, it may be from a calculus or from a mass of pus. If the other kidney is sound, the urine secreted by that organ will alone gain the bladder, and thus no abnormality may be observable. Symptoms.

In some cases of pyelitis, a tumour may be perceptible in the situation of the affected kidney on abdominal examination. More frequently this is not the case.

Pyelitis is a serious disorder, often of long duration; and the risks attending the disease are by no means inconsiderable. The patient may die exhausted by the drain of the discharge; or, the kidney being partially destroyed, and merely a pus-containing sac, rupture of this sac may occur

through what remains of the renal cortex and capsule, and a perinephritic abscess result. If both kidneys are the seat of pyelitis, the prognosis is, of course, still worse; in such cases uræmic symptoms are likely to develop, and the death of the patient is then inevitable.

A certain degree of hectic fever is often present in pyelitis; but in some cases septicæmia, with rigors and a characteristic temperature, may result, and lead to the fatal event.

When pyelitis is the result of tuberculosis of the kidneys, it is scarcely necessary to say that the prognosis is as bad as possible. In addition to the risks arising from the destruction of the kidney, there is always the likelihood of an outbreak of general tuberculosis.

In some cases the symptoms of pyelitis gradually disappear, the urine becomes more healthy, pain vanishes, and the temperature becomes normal. Under such circumstances the patient may recover completely. Doubtless, in these favourable instances, the purulent matters dry up, and are partially absorbed, and partially become caseous and calcified. But this favourable event is of rare occurrence.

As regards calculous pyelitis, the prognosis is certainly more favourable than in the pyelitis of tuberculosis or of malignant disease. This is to a great extent due to recent advances in the surgery of the kidney, by which it is possible to remove the diseased organ bodily. Assuming, as is often the case, that the remaining kidney is sound, there is every reason to anticipate recovery after removal. Indeed, numbers of cases are now on record in which the kidney has been removed for calculous pyelitis, and in which, years afterwards, the patient was in good health. It should be added that not always do the symptoms usually characteristic of pyelitis arise. We have recently seen a case in which total destruction of the left kidney, with the accumulation of a large quantity of fœtid pus, due to renal calculus, was entirely free from any marked

symptoms except that of pyuria. In this instance the patient walked into the out-patient room, complaining only of slight weakness and shortness of breath. He incidentally mentioned that his water had been lately "whiter" than usual (it was laden with pus), and this was the only clue to the real nature of the case.

From what has already been said, it will be gathered that calculus of the kidney and tuberculosis of the same are perhaps the most frequent morbid conditions in which pyelitis occurs. It may arise also from a calculus which, leaving the kidney, has become impacted in the ureter. The urine, not being able to escape, accumulates in the renal pelvis, and sets up inflammation of the mucous membrane, with resulting formation of a pyonephrosis.

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Malignant disease of the kidney may lead to the development of pyelitis. A by no means uncommon mode of causation is by the extension of inflammation from the lower urinary passages. Thus diseased conditions of the urethra, especially stricture of the prostate gland, or of the bladder itself, may all, by propagation of inflammation upwards along the ureters, lead to the lighting up of pyelitis. Whether the inflammation of the renal pelvis ever arises, as it were, spontaneously, or from exposure to "cold," is extremely doubtful; pyelitis is practically always a lesion supervening in the course of, and complicating, other maladies. It has been observed in rare cases to arise in connection with enteric or other fevers. In these cases it runs a mild course, and recovery always ensues.

The morbid appearances are those of the malady upon which the pyelitis depends. In tuberculosis, the kidney may present the appearance of a collection of abscesses, each pyramid being replaced by an accumulation of pus, the cavities containing which are bounded by the natural divisions between the pyramids. The walls of these cavities are very thick, and rough on the surface, on which phosphates are frequently precipitated. The pus may be fluid, or of the consistence of thick paste. The cortex in

extreme cases is also destroyed, and perinephritic abscess may be discovered.

In calculous pyelitis, the calculus may be situated either in the pelvis or in the cortex, and much abscess formation from the irritation of its presence may result.

When the inflammation is propagated from the lower urinary passages, the lesions may be multiple, presenting the appearance of pyæmic or septic abscess, and be separated from one another by uninjured renal structure. Should a calculus be impacted in the ureter, the portion of the duct above the obstruction will be dilated, and the pelvis of the kidney will be found also in the same condition.

Pyonephrosis is the name applied to the filling of the renal pelvis with pus, due to the presence of an obstacle in the ureter, by which the escape of purulent matter from the kidney is hindered. A large tumour may result, which can be readily detected in the abdomen. Fluctuation may be perceptible in this tumour. There is danger that such a pyonephritic sac may burst, either spontaneously or as the result of an injury. Such an accident is of extreme gravity, and death may ensue rapidly from shock, or, if the pus gain access to the peritoneum, from peritonitis. Under any circumstances, a perinephritic abscess, with all its attendant dangers, will result.

Treatment.

This is that of the disease on which the pyelitis depends. Unfortunately, it is by no means easy to establish the diagnosis in many cases. If it is possible to determine the diagnosis in calculous cases, there can be no doubt that the operation of nephrectomy, or nephrotomy, gives the patient the best chance. In tubercular disease there is little to be done. In cases of pyonephrosis, if the tumour can be tapped and drained, good results may ensue.

When "surgical kidney," a term applied to the involvement of the renal pelvis and secreting structures from disease of the lower urinary tract, is present, the treatment is that of the stricture or bladder lesions, on which the renal complication depends. But under any

circumstances the prognosis in these cases is highly unfavourable.

In all forms of pyelitis, it is advisable for the patient to drink freely of water and of other bland fluids. Vichy water may be useful, especially in calculous cases. Pain must be treated by warm fomentations, or by poulticing. Citrate of potash, or alkalies, with infusion of buchu, may frequently be prescribed with advantage.

HYDRONEPHROSIS

IF, from any cause whatever, the urine cannot escape from the pelvis of the kidney, owing to obstruction of the ureter, the secretion naturally accumulates behind the obstacle, and dilatation of the passages above the obstruction must ensue.

To this condition the term hydronephrosis is applied.

Symptoms. The symptoms of hydronephrosis include the presence of a swelling in the region of the affected kidney, which may be of very large size; the tumour may occupy a considerable portion of the abdominal cavity, and may extend to the middle line, or may even transgress it. As the tumour is full of fluid, it is, of course, sometimes possible to detect fluctuation in it; further, it is often much distended and very tense.

A certain amount of pain, often of dragging character, or merely a sense of discomfort, may attend the presence of the tumour; but so long as the remaining kidney remains healthy, no serious symptoms need arise.

Occasionally, but rarely, from time to time an abundant flow of urine, which is usually pale in colour, and of low specific gravity, takes place, and the tumour either diminishes much in bulk or disappears entirely. Such an occurrence is, of course, highly suggestive of the case being one of hydronephrosis.

When the morbid condition is but slightly developed, no symptoms whatever may be complained of, the malady being entirely latent.

The fluid contained in the hydronephrotic sac is in most cases greatly diluted urine; it is often quite clear, but usually contains a trace of albumen. Sometimes, but rarely, it may be blood-stained.

It is hardly necessary to point out that in chronic cases the constant pressure of the fluid must act disastrously on the renal structure. In fact, the size of the pelvis of the kidney increases at the expense of the secreting tissue of the latter, so that in extreme cases all traces of the kidney proper may disappear, or be replaced by a mere shell.

Hydronephrosis is very rarely bi-lateral. When this is so, there is, of course, great danger to life from the supervention of uræmia.

It is very seldom that suppuration ensues in hydronephrosis; if this should happen, a pyonephrosis, of course, results, and the constitutional symptoms associated with the production of pus will then develop.

A hydronephrotic tumour may be mistaken for cystic disease of the kidney. When it is borne in mind that the latter affection affects both kidneys, and that the shape and outline of the organs are still to a certain extent preserved, it is not likely that mistakes can arise.

A malignant growth in the kidney can scarcely be confounded with hydronephrosis, inasmuch as marked wasting, hæmaturia, and the presence of a hard mass attend the former malady, features which are quite alien to the latter affection.

Perhaps the most usual cause of hydronephrosis, when the malady is not congenital, is the impaction of a calculus, which has escaped from the kidney, in the ureter. The condition may also be induced by the presence of tumours, and this when the kidney and ureter are perfectly healthy; for instance, the pressure may be due to an ovarian tumour, or to a malignant growth in the abdominal cavity.

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Not seldom the spread of inflammation from the lower urinary passages, in connection with disease of the bladder or urethra, may cause hydronephrosis by the consequent involvement of the ureter causing an obstacle to the onward progress of the urine.

Finally, in a large proportion of cases the malady is of congenital origin. In such instances the ureter may be

imperforate, or it may be twisted in such a way as to effectually cut off connection with the bladder ; or, again, the lumen may be obstructed by folds of the lining membrane of the duct.

The morbid appearances consist in a dilatation of the ureter and renal pelvis above the obstacle, together with more or less serious changes in the renal tissue itself. At first the latter may consist merely in flattening and wasting of the portions of the kidney structure most vulnerable to pressure, viz., the pyramids ; but sooner or later the changes incidental to chronic interstitial nephritis ensue, the kidney becoming the seat of an overgrowth of fibroid tissue. Finally, if the case is not relieved, the continued pressure causes absorption and disappearance of the remaining renal structure, nothing being left in extreme cases but the fibrous shell formed by the capsule of the organ.

Treatment.

The only treatment which appears at all likely to be successful is that of the malady upon the presence of which the hydronephrosis depends. It is obvious, therefore, in congenital cases, that paracentesis of the tumour is the only measure which is available. This operation has been frequently performed, both in congenital cases and in those not amenable to successful treatment directed to the cause of the condition.

It cannot be said, however, that the results are satisfactory ; in nearly all cases the fluid rapidly reaccumulates, so that repeated tapplings are necessary.

In some cases emptying of the sac has been effected by massage and manipulation, but very often the patient cannot tolerate these movements ; and even if success is attained, it is extremely probable that the accumulation of fluid will return.

Better results are obtained by the removal of the whole diseased structure ; and as in severe cases, which alone require interference, the kidney is invariably destroyed, no harm, but much good, may result to the patient from its entire ablation.

RENAL CALCULUS

THIS malady may occur at any age, and in either sex ; it is by no means infrequently met with in childhood.

Calculus in the kidney gives rise usually to pain, which is generally referred to the loins, and is often, in the adult, paroxysmal. Symptoms.

The attacks of pain come on suddenly, and are very severe ; the pain passes down in the course of the ureter to the testicle of the corresponding side, and the latter is often retracted. Not seldom the suffering is so severe that symptoms of collapse, faintness, coldness of the skin, feeble and irregular pulse, are induced. After continuing a longer or shorter time, the pain often ceases abruptly, to be succeeded by a sensation of dull aching in the affected loin.

The pain is doubtless caused by small calculi or particles passing along the ureter from the renal pelvis, and it ceases as suddenly as it commenced, either through the calculus slipping back into the pelvis of the kidney or from its passage into the bladder.

Apart from these severe paroxysms of pain, there may be more or less continuous dull, aching pain or discomfort in the lumbar region.

In children attacks such as those just described are far more seldom met with than in adults ; in them the pain may be in the loins, or referable to the front of the abdomen and neighbourhood of the umbilicus. When genuine renal colic does occur in children, it may be the cause of convulsions, the explanation of which may not be obvious unless the possibility of calculus in the kidney being the cause is borne in mind.

The pain in cases of stone in the kidney is often excited

by sudden jolts, or by jumping, or by travelling over a rough road. It is very rarely that a distinct mass can be made out on palpation, but pressure in the region of the affected kidney may be very painful.

A very important symptom of renal calculus is hæmaturia. As with pain, so with hæmaturia, it occurs frequently in attacks, during the intervals between which the urine may be entirely free from blood; the latter is intimately mixed with the urine, the tint of which may vary from mere "smokiness" to a deep blood-red.

Pyuria may also be present, but to a markedly less extent than in tubercular disease.

In many cases calculus in the kidney is quite latent, and in others the only evidence of its presence is the occurrence from time to time of attacks of hæmaturia. The urine may deposit crystals of uric acid, though it must not be forgotten that the occasional occurrence of such crystals may be due merely to an over-acid condition of the secretion. In all cases a microscopical examination of the latter should be made, when perhaps uric acid crystals, or those of oxalates, may be detected.

Renal calculus is a very serious malady; among the risks of the disease are the tendency to the production of pyelitis, and to the extension of the suppurative process to the surrounding connective tissue, with the formation of perinephritic abscess. Further, the inflammatory process may extend to the lower urinary passages. Hydronephrosis, too, may result from blocking of the ureter. The passage of a calculus into the bladder may be followed by symptoms of stone in that organ.

In diagnosing this malady, the chief features to which the attention should be directed are the occurrence of renal colic, of hæmaturia, and of crystals of uric or oxalic acid in the urine.

A gouty inheritance is certainly a factor in the causation of this disease; actual gout in the patient himself is not infrequently found to be associated with the presence of a

renal calculus. But stone in the kidney may occur without any history of gout, either in the patient or his ancestors, being obtainable.

It is not rare to find calculi in the kidney of quite young children, in whom no symptoms of any kind have been present to indicate the lesion. We have seen the post-mortem examination of a child aged two years, who died from summer diarrhoea, and in the pelvis of one kidney two calculi were found—one the size of a small bean, the other that of a pea. Both were irregular on the surface, though not rough, and both consisted of uric acid. It is difficult to explain the causation in cases such as this. As is well known, the deposit of urates is not uncommon in the kidneys of young children, and it is possible that the presence of such deposits may lead to the precipitation of uric acid, with resulting formation of calculi. But this is mere hypothesis.

It must be admitted that in many cases it is impossible to give a satisfactory explanation of the origin of calculus in the kidney.

Most renal calculi consist of uric acid, and are comparatively smooth on the surface. But those formed of oxalates are not very uncommon; these are rough superficially, and are known as “mulberry” calculi. Phosphatic deposits are not uncommonly observed on the surface of uric and oxalic acid calculi; they are far more often met with in calculi of the bladder than in those of the kidney.

The result, as regards the kidney, of the presence of a renal calculus varies considerably. The organ may be nearly normal, or it may be chronically congested or inflamed. Every stage may be found between this condition and that of complete disorganisation, with pyelitis and secondary implication of the lower urinary passages.

This is prophylactic and palliative, or radical, when the Treatment. disease is actually developed.

In those liable to renal calculus from hereditary gouty tendency, and in those in whom uric acid is passed in the

form of granules, dietetic measures are of the first importance. The quantity of proteid material ingested must be greatly restricted, butcher's-meat being often altogether inadmissible. In such cases a farinaceous diet, with abundance of milk, is desirable. Alcohol in all forms is most injurious.

In children the importance of the observance of strict dietetic rules when a calculous tendency exists cannot be too strongly insisted on. In view of the fact that during infancy there is a marked liability to the deposit of urates in the kidney, it is very desirable that small children be allowed a plentiful supply of water. An unfortunate prejudice exists which denies to infants and young children a sufficient supply of pure water. This prejudice, bad in all cases, is especially disastrous when, by heredity or otherwise, the child is the victim of a calculous tendency. To such children meat must be most sparingly allowed, and pastry, sweets, and starchy materials, as far as possible, excluded.

In cases of suspected calculus, the patient should be kept in bed, and alkalies, together with abundance of water or other bland fluids, administered. Under such treatment many cases of hæmaturia, due to the presence of small calculi, mend greatly; the blood disappears from the urine, the latter becomes less acid, and pain is no longer complained of. A similar happy result will occasionally follow a course of treatment at Contrexéville, whose waters certainly seem to possess some influence in expelling small renal calculi. Many other natural waters, best taken at their source, may also be beneficial, particularly those of Vichy and Evian.

When renal colic occurs, the paroxysm must be treated by warm baths, warm applications to the loins, hypodermic injections of morphia, and by most careful dieting.

In cases which do not respond to treatment, and in those in which very severe pain constantly tortures the patient, the question of radical treatment by surgical operation

must be considered. If it were possible to be in all cases certain of the diagnosis, this would clearly be the most satisfactory method of dealing with large stones in the kidney. Unfortunately, however, it is by no means always possible to be so confident of the presence of a calculus that an operation can be justifiably undertaken. In some cases the symptoms thought to be those of calculus are in reality due to tubercular disease, and *vice versa*. But when the diagnosis is certain, the operation is often a very successful one.

Nothing has been said concerning the so-called "solvent treatment" of renal calculus by the administration of alkalies, as it is impossible to dissolve a stone of any magnitude by this means, and there is a further danger of the alkaline urine forming phosphatic concretions over those which constitute the original nucleus.

In some obscure cases the use of the Röntgen rays apparatus may be a valuable aid in the diagnosis of renal calculus.

TUBERCULAR DISEASE OF THE KIDNEY

THIS form of renal disease occurs either as a primary lesion of the kidney or as a secondary affection of the organ in what is, in reality, a more or less generalised tubercular process.

Symptoms.

In the latter case the symptoms are not characteristic of any special lesion of the kidney, so that no definite evidences of renal disease are present. When tubercular disease of the kidney is primary, it is quite otherwise, for then the symptoms are both marked and definite. These symptoms consist of pain in micturition, which is unduly frequent, the presence of pus in the urine, and occasionally the occurrence of hæmaturia. Pain in the lumbar region is also frequently present, but a distinct tumour in the situation of the kidney is but seldom to be detected.

Accompanying these evidences of renal lesion there may be hectic fever, night sweats, and rapid loss of flesh.

Not seldom, however, but few of these symptoms are present, and in a large number of cases the occurrence of pus in the urine is the only evidence of the morbid changes which are in progress in the renal organ. Sometimes, indeed, the disease remains entirely latent, giving rise to no symptoms whatever, and the urine being normal throughout, probably from obstruction of the ureter leading from the diseased kidney.

Usually the reaction of the urine is acid, in spite of the pus which it contains; but should cystitis be present, the reaction will become distinctly, or even strongly, alkaline.

Tubercular disease may be limited to one kidney; more often both are involved, but one being in a more advanced

stage of disease than the other. The malady is sometimes associated with the presence of calculus, which is generally composed of uric acid. Not seldom a calculus becomes impacted in the ureter of the diseased kidney, and then hydronephrosis may result, or one of those periods frequently observed in the course of this disease, during which the previously purulent urine becomes clear and healthy. This, of course, can only happen when the remaining kidney is sound. Acidity of the urine in this disease is compatible with the presence of a very offensive odour of this secretion; the disagreeable smell does not necessarily point to decomposition of the urine, but in such cases there is great danger of cystitis being induced.

The course of tubercular disease of the kidney is generally protracted, unless some complication arises by which life is terminated. It is obvious that all the conditions are present for the lighting up of a general tuberculosis, and the death of the patient is always possible from this cause.

A perinephritic abscess may form, which may burrow in various directions, of which one of the most important is downwards in the sheath of the psoas muscle. In this way the clinical aspect of the case may be that of psoas abscess, due to disease of the vertebral bodies. Or the perinephritic abscess may burst into the peritoneal cavity, in which case possibly severe collapse will set in, and will be shortly followed by the death of the patient.

Should both kidneys be seriously affected, it is possible that a sudden attack of convulsions, passing into coma and death, may supervene, these symptoms being, of course, due to suppression of urine. In many cases the patient dies from asthenia, the result of the constant drain of the discharge, and the same cause may also lead to lardaceous degeneration of the liver and other organs.

It will thus be obvious that tubercular disease of the kidney is an extremely serious malady, and one liable to terminate fatally in many different ways.

The disease occurs at all ages, but is perhaps relatively more frequent in children ; it must not be forgotten that it may be met with in quite young infants.

The diagnosis of tubercular disease of the kidney is not always easy, and it is especially liable to be confounded with renal calculus. In the latter malady there is generally pain, which may be paroxysmal, and is often elicited by sudden jolts, such as may be experienced in driving over a rough road, or in young children by dandling them, and the quantity of pus in the urine is but small.

In tubercular disease these conditions are usually reversed, for, as a rule, there is little or no pain, and pus is present in considerable, or even in large, quantity. Microscopical examination of the urine may be of some slight service, for in calculous cases crystals either of oxalates or of uric acid may be present. It is hardly necessary to say that the detection of tubercle bacilli in the urine would be of supreme importance for the diagnosis of tubercular disease ; but very often, indeed, the search for bacilli, even in cases in which tubercular renal disease is unquestionably present, gives negative results.

In every case a most thorough examination should be made for the detection of tubercular deposit elsewhere, especially in the lungs, bones, and joints ; further, an investigation of the condition of the testicles must not be omitted.

It must be borne in mind that the two affections, calculus of the kidney and tubercular disease of the same organ, may co-exist, as referred to above.

Causation
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Anatomy.

It is difficult to define any other definite etiological factor in this disease, except hereditary tendency to tuberculosis, and certainly in many cases this vice of constitution is absent, so that only too often the real cause of the disease is veiled in obscurity. The sequence of events may be that the disease, originating in tubercular affection of the testicle, the vesiculæ seminales, or the bladder, is transmitted by the ureter to the kidney, so that implication of the lower

urinary passages is followed by that of the renal organs.

Any portion of the renal structure may be the seat of tubercular deposit, the cortex and medulla of the organ being equally liable to be attacked. The result is always the same—caseation and softening of the tubercular deposit, the diseased areas often corresponding more or less roughly in size and shape to the pyramids and adjacent cortex. The process resembles that which takes place in the lungs in chronic phthisis, when, by the disintegration of the tubercular matter, cavities are formed; just as in the pulmonary organs, too, thick strands of fibrous tissue may divide the areas of caseation and softening one from the other.

The contents of the diseased areas are often soft and yellowish in colour, but not seldom consist of pure pus. In other cases they are caseous and semi-solid, containing deposits of uric acid or of phosphates. In advanced stages not merely the secreting tissues, but the pelvis of the kidney is also involved; and when this is the case, the ureter in no long time will itself become the seat of disease. The mucous membrane, both of pelvis and ureter, becomes greatly thickened, and possibly ulcerated, leading, in the case of the ureter, to obliteration of its lumen, the closure of the latter being just as complete as if it were blocked by a calculus.

The roughened and ulcerated mucous membrane of the pelvis and ureter is not infrequently covered with crystals of urinary salts, which, as mentioned above, may also be found in the contents of the diseased areas situated in the renal cortex. When the disease is of long standing, there may be scarcely a trace of healthy renal structure on section of the kidney, the organ being nothing but a pus-containing sac more or less sub-divided by septa in the manner described above.

When the kidney is the seat of tubercular deposit merely as an incident of a general tuberculosis, the appearances are

very different to those just discussed. The organ is practically healthy except for the presence of more or fewer isolated tubercular masses, which may vary in size from a mere speck to a small pea, which are white or grey in colour, and which are scattered indiscriminately over both cortex and medulla, but which show little or no tendency to softening and caseation.

Treatment.

Short of direct surgical intervention, there is not much to be done in cases of tubercular disease of the kidneys. Sometimes there is a tendency towards arrest of the diseased process by calcification and discharge of the tubercular material. Should the remaining kidney be sound a spontaneous cure may in this way be effected, but even then there is always the danger of a recrudescence of the disease. Such periods of improvement are very likely to be mistaken for "cures," the result of treatment.

In all cases the general health should be maintained in good condition by a residence at the seaside or in the country, and by an abundant and nutritious diet.

Cod-liver oil, iodide of iron, or Easton's syrup, are all of use; so also are quinine and tonics generally. Should hectic fever supervene, with rapid deterioration of health, it may be advisable to undertake an exploratory operation, or even to remove the diseased kidney. In some cases such operations have proved successful when the other kidney has been sound.

Considerable assistance in the determination of the condition of both kidneys is sometimes yielded by the use of the cystoscope, whereby the orifices of the ureters can be examined. Thus the employment of this instrument is indicated before operation is undertaken.

TUMOURS OF THE KIDNEY

GROWTHS in the kidney may be innocent or malignant. Among the former, fibromata of small size may be met with, and lipomata, adenomata, and lymphadenoma have been described. Far more frequently, however, renal tumours belong to the malignant class, and are usually sarcomatous, carcinoma occurring much more rarely.

The symptoms and physical signs of growths in the kidney are the presence of a tumour, pain, and hæmaturia, together with progressively increasing loss of flesh and strength. The tumour is situated on one or other side in the lumbar region, and rapidly attains large proportions. It may become of such size as to practically fill the abdominal cavity. The tumour may be freely movable or fixed, and its surface may be smooth, or the seat of one or more projections. In the course of its progress, it may by pressure seriously interfere with the circulation, and oedema of the lower extremities may in this way result. Frequently the skin of the abdomen becomes covered with a network of dilated veins, in consequence of the embarrassed venous return due to the pressure of the tumour. Obstinate constipation may also result from the same cause, and in some cases the descent of the diaphragm is so hindered that much difficulty in breathing results. Symptoms.

Pain is a symptom that is not always present; in some cases nothing more than a sensation of weight and dragging is complained of, in others the pain may be both continuous and severe.

Hæmaturia may or may not be present. It may occur as the very first indication of disease, or may be entirely absent throughout the progress of the case; or, again, may

only ensue late in the disease. Sometimes the blood is passed in clots, which cause great pain during their progress through the ureter. Secondary deposits not seldom arise from conveyance of the elements of the tumour by the veins and lymphatics; and the neighbouring lymphatic glands are also, for the same reason, enlarged.

In all cases the general health is gravely compromised. Loss of flesh and strength rapidly ensue, and usually death occurs within twelve months of the onset of the disease.

In making the diagnosis, it is important to remember that the colon, in renal growths, passes in front of the tumour. A tumour of the left kidney might conceivably be confounded with an enlarged spleen, but attention to the presence or absence of a notch, or of notches, in the anterior edge of the mass, and the position of the colon in relation to it, will prevent the possibility of error.

In the case of a movable kidney becoming the seat of malignant growth, mistake may arise from its confusion with disease of the ovary or uterus. The renal tumour will be extremely movable, which is not the case with growths affecting the pelvic organs, and a careful investigation of the condition of the latter will prevent a mistake in diagnosis. As a rule, when malignant disease attacks the kidney, secondarily to a new growth elsewhere, no symptoms arise which point to the involvement of the renal organ.

It has been already mentioned that new growths in the kidney are nearly always malignant, and of sarcomatous nature. When carcinoma does occur, it is usually soft, and of the encephaloid variety. Tumours of the kidney are relatively more common in children than adults, and then are almost invariably sarcomata. Not unfrequently they are congenital.

The structure is often that found in adenoid sarcoma, and round and spindle-celled growths are of quite usual occurrence. Muscular tissue may also be present, giving rise to a myo-sarcoma. Sarcoma of the kidney is liable to be

attended with hæmorrhage into the substance of the new growth, and is also prone to degenerations, fatty and otherwise. Malignant disease may affect the whole renal structure, so that the tumour may preserve in a general way the outline of the organ, or it may develop more in one part of the kidney than in another, so that an irregular mass results. Usually the growth commences in the cortex, but it may begin in the pelvis. When this is the case, the rapidly-growing tumour presses on the cortical substance, which becomes attenuated, and may finally disappear, owing to the pressure of the new growth. It is important to remember the fact, already incidentally referred to, that a movable kidney may occasionally become affected with malignant disease.

There are no means, short of total removal, of arresting the growth, or of causing the disappearance, of a tumour of the kidney. Operations for the extirpation of the gland, when affected with malignant disease, have been undertaken, but their success has been so qualified as to practically render the procedure unjustifiable. An exception may perhaps be made when a wandering kidney is the seat of malignant disease. Treatment.

The malady is a fatal one, and all that can be done is to treat symptoms as they arise, and to support the general health. The chief symptoms requiring attention are hæmaturia and pain. For the former the usual hæmostatic remedies may be employed, and for the latter opium given by the mouth, or morphia hypodermically, together with local application of belladonna, aconite, or other analgesics.

If the tumour is certainly innocent, nephrectomy might, the other organ being sound, be performed with some hope of success.

PERINEPHRITIC ABSCESS

PERINEPHRITIC abscess is generally due to agencies acting outside the kidney, and the most usual cause thus acting externally to the renal organ is spinal caries. The disease may likewise be due to injury, or it may arise from a lesion of the renal pelvis or cortex, such as that associated with tuberculosis, malignant disease, or the presence of a calculus, with rupture through the substance of the kidney into the perinephritic tissue.

Symptoms.

The symptoms of the disease are those of suppuration in the region of the kidney ; pain, great tenderness on pressure, the urine being healthy in those cases not connected with antecedent pyelitis, and fever. The pus not infrequently traverses the sheath of the psoas muscle and presents under Poupart's ligament, like psoas abscess ; or the abscess may burst into the peritoneum, externally, or into the pleural cavity.

Morbid Anatomy.

The morbid anatomy is that of the disease on which the condition depends.

Treatment.

This is carried out by free incision or by aspiration, in order that the pus cavity may be evacuated and drained.

CYSTIC DISEASE OF THE KIDNEY

IT is not at all uncommon at post-mortem examination of cases dying from interstitial nephritis to find the cortex of the kidney to be the seat of numerous small cysts. These cysts are often about the size of a pea, and are filled with a clear fluid. They are usually found on the surface, just beneath the capsule, and doubtless owe their origin to blocking of the lumen of renal tubules.

A similar condition may also occur in otherwise healthy kidneys if, from any cause, an obstruction in the *tubuli uriniferi* should have arisen. In such cases the cysts may be larger, attaining even the size of a Tangerine orange. Neither of these forms of cystic affection of the kidney is, however, of importance, and no symptoms characteristic of this form of cystic disease arise.

It is otherwise with that form of cystic degeneration of the kidneys which is congenital. In this case the normal size of the renal organs—for both kidneys are affected—is greatly exceeded in consequence of the replacement of the normal structure by the union of immense numbers of separate cysts, each individual cyst varying in size from a large pea to a walnut, on the average. The contents of these cysts are usually fluid, and the latter bears more or less resemblance to normal urine; but, on boiling, albumen is often found to be present. Sometimes the contents of the cysts are solid or semi-solid, and gelatinous.

The weight of the diseased kidneys may be very considerable, amounting sometimes to several pounds, and the space occupied by the large mass may be so great that in

women, serious impediments may arise to the birth of the child ; indeed, it may be necessary to resort to operative measures, and in some cases the destruction of the child may be necessary in order to save the life of the mother.

When the kidneys are thus affected, it is not unusual for other congenital deformities to be also present ; thus there may be some fault of development of the genito-urinary system, or entire absence of the anus. Should such defects of development occur, the child, as a rule, dies shortly after birth. In other cases, however, in which cystic disease of the kidneys is alone present, it would seem that life may be prolonged for years, provided that the kidneys are able to discharge their normal functions to a certain limited extent. In such conditions a tumour in the situation of the kidney is not invariably present, and there may be no symptoms whatever which would lead to the suspicion of the presence of a serious lesion of the kidney.

On the other hand, it may be that some years before death symptoms of renal disease creep on insidiously ; they are usually those indicative of the onset of granular kidney. A tumour may gradually develop, and it may, at a certain stage of the malady, increase rapidly in size. Examination may reveal hypertrophy of the left ventricle, and the presence of a pulse of renal quality.

It will be gathered from what has been said above that it may be difficult to differentiate cystic disease of the kidney from hydronephrosis, and from hydatid disease affecting the renal organ. As regards the latter affection, the only mode of differentiation consists in the microscopic examination of fluid withdrawn from the tumour, when the presence of hooklets will be decisive for the diagnosis of hydatid disease. As regards hydronephrosis, this disease is usually unilateral ; the form of the kidney is less evident than in cystic disease, and the history of the case will often afford help in making the diagnosis.

As regards the treatment of cystic disease of the kidney,

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nothing can be done beyond the employment of such remedies and modes of treatment as are suitable to chronic nephritis. Even when the condition is capable of being diagnosed, operative measures would be undesirable.

CHYLURIA—FILARIASIS

CHYLURIA is a disease which is practically confined to tropical or sub-tropical countries ; when seen elsewhere, it is nearly always due to the fact of the patient having travelled or resided in one of those countries to which the disease is limited.

Symptoms.

The presence of the malady is indicated by the discharge from time to time of large quantities of chyle or lymph with the urine. The urine, except for this admixture, is healthy, but the chyle contained in it gives it a milky appearance, and on standing a coagulum forms of a whitish or yellowish colour, and of soft consistence. But occasionally the tint of the urine and coagulum, instead of being white, is pinkish ; when this happens, the colour is due to the presence of blood in the chylous fluid.

Not invariably, however, is chyle added to the urine—it may be that the fluid poured out is lymph ; should this be the case, the milky aspect of the urine may be only slightly marked, or completely absent. Under these circumstances, too, the clot will be much less coherent than in the former case.

Very often the only evidence of the presence of the malady is the altered condition of the urine, but in some cases the attack is attended with some uncomfortable sensation in the region of the kidney or in the bladder, and occasionally the patient complains of a feeling of *malaise* and debility.

The affection is extremely erratic in its times of appearance, but a tendency to periodicity in the return of the symptoms has been noticed in some cases. Thus for long periods of time the aspect of the urine may be perfectly

normal in a case of chyluria, and then once more it may present the characters peculiar to this malady.

The general health may be for long unaffected by the recurring attacks of chyluria, but sooner or later the drain of large quantities of nutritive material tends to produce marked symptoms of debility and anæmia. Further, it must be borne in mind that coagulation of the chylous fluid may take place within the body, giving rise, perhaps, to obstruction of the ureters, or, if it occur in the bladder, to the formation of a calculus.

There can be no doubt, in the light of recent researches, that chyluria is due to the presence of the *Filaria Bancrofti*, and of its embryonic form, the *Filaria nocturna* of Dr. Manson.

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Anatomy.

The parasite in its embryonic form was formerly known as *Filaria sanguinis hominis*, but Dr. Manson's researches prove that more than one species of the genus *Filaria* occur in human blood, and he has given the specific name *nocturna* to that form of the parasite which causes the symptoms of filariasis.

This animal is a nematoid worm, about the diameter of a red blood corpuscle, and it tapers at one end.

In its mature form the filaria is about two inches long, and is very slender, resembling a hair.

Dr. Manson has proved that the *Filaria nocturna* may be conveyed to the human subject by the bite of mosquitoes, which have sucked the blood of a patient, the victim of filarial disease. The embryonic form of the parasite is carried by the mosquito, and should a healthy person be bitten by the insect, the parasite may be introduced into the blood of the person attacked. It is possible, too, that the embryonic filaria may be deposited by mosquitoes in water, and by the consumption of the contaminated water the disease may be conveyed to hitherto healthy people.

Under any circumstances, therefore, it is certain that mosquitoes have much to do with the transmission of the disease.

The filariæ having entered the human body, gain access to the lymphatics, lacteals, and lymphatic glands. When thus lodged, sexual maturity is attained, congress of the sexes takes place and new embryo filariæ are carried into the lymph and lacteal streams, whence they gain the blood. It has already been stated that the adult filariæ are of considerable length, and it is to the presence in the glands, lymphatic and lacteal vessels of these mature forms of the parasite that symptoms are chiefly due, although Dr. Manson considers that the embryonic worm, though frequently harmless, may yet, to a certain extent, be responsible for the appearance of symptoms of filariasis.

The parasites obstruct the vessels in which they reside, the result being that the pressure is raised in the vessel behind the obstacle, and in this way it is conceivable that rupture of the vascular wall may occur. If the lymphatics of the pelvis of the kidney are obstructed, a communication may in this way be established between the lymphatic system and the urinary outflow, or the same result may ensue should the lymphatic network undergo a breach of surface or actual ulceration.

In a similar manner a communication may be established between the lymphatics of the ureter or of the bladder and the interior of those organs.

It is a remarkable fact that filariæ, except in very small number, are found in the blood only during hours of repose, and therefore usually at night, hence the specific name of this genus. During the daytime, or, to speak more correctly, during working hours, they are almost entirely absent from the blood. Dr. Manson has ascertained that during the day the embryonic filariæ crowd together in the vessels of the lungs and in the larger arteries, which explains the difficulty of their detection in the blood during working hours.

The above explanation of the phenomena of chyluria is certainly correct in the majority of cases ; yet it cannot be denied that difficulties sometimes arise in accepting this as

the sole mode of causation of the disease. Instances occur in which undoubted chyluria is present, and yet no filariæ are discovered either in the blood or urine. It may be, of course, that more accurate examination would lead in such cases to the detection of the parasite, but it would appear to be more probable that exceptionally chyluria may occur apart from the presence of embryonic filariæ.

It must be understood that the filariæ do not by any means limit their ravages to the lymphatic vessels of the urinary tract. On the contrary, they may affect the lymphatic system in many and various localities. So that chyluria is in reality only one manifestation of the disease—*Filariasis*. The malady may present itself under the aspect of lymph scrotum, of elephantiasis arabum, of chylous ascites, or in other forms.

The treatment of chyluria is by no means satisfactory. Treatment. It is obvious that no means exist by which the body can be relieved of the parasite, and hence all that can be done is to palliate the symptoms by rest and careful dieting. Many drugs have been recommended in the treatment of this disease, especially gallic acid, quinine, or iodide of potash. It is highly improbable that any drug has a good influence on the course of the malady.

In view of recent discoveries as to the part played by mosquitoes in transmitting the disease, it is very necessary that prophylactic measures be rigidly enforced. The avoidance of water to which these insects have access is therefore of paramount importance, as is also, as far as possible, the prevention of the attacks of the mosquitoes themselves.

PAROXYSMAL HÆMOGLOBINURIA

THIS is a rare disease, in which the urine suddenly undergoes marked and important alterations, the changes taking place at quite irregular intervals, or tending to recur at more or less definite periods.

Symptoms.

A patient who is about to be attacked with paroxysmal hæmoglobinuria often complains of a sensation of cold or chilliness, and he may shiver; at the same time there is frequently a feeling of weakness and lassitude. The skin is often pale and cold, and when the patient next passes water he is greatly surprised and alarmed to find the urine much altered in appearance, it being, as he describes it, "like blood."

The abnormal appearance which has attracted the patient's attention may occur only once; on the other hand, it may persist for some hours, or even a day or two. Under all circumstances, and whether the duration of the morbid appearance be long or short, it finally passes off, the colour of the urine becoming absolutely normal. At the same time, the symptoms of which the patient complains all pass off, and the attack is over.

But the malady may recur, and this at the end of some few hours only. In this way the illness may be prolonged for one or two days, the condition of the urine being perfectly normal in the intervals between the attacks.

But more often long periods of time may intervene between the attacks; it may be that months separate two consecutive seizures.

We have seen a case in which the patient suffered almost invariably in this manner about every six

months. In this case the chilliness and debility persisted for a day or two, during the whole of which period the urine presented the characteristic alterations; and then rapid amendment occurred, and within another twelve hours the patient was well in all respects.

In this instance, and, indeed, in our experience, invariably, every attack is ushered in by precisely the same symptoms, and the subsequent course of events is always uniform.

There is no deterioration of the general health, and the malady does not appear in any way to shorten life, much less to tend to a fatal termination.

There has sometimes been noticed a tendency for those who have been affected with ague to manifest later the symptoms of paroxysmal hæmoglobinuria. Probably this is due to mere coincidence, as there does not appear to be any direct connection between the two maladies, at all events as regards the cases seen in this country.

Whether "black water fever" of the West Coast of Africa is in any way allied to paroxysmal hæmoglobinuria is an open question, but that the malady is in some way connected with the malarial poison is, of course, perfectly clear.

In almost all cases the direct cause of an attack of hæmoglobinuria is exposure to cold. The close connection between this exposure and the onset of symptoms is so patent that all doubt may be excluded. It may be that the symptoms appear after a slight wetting, or if the patient has been sitting in a draught. There has been thought, also, to be a connection between rheumatism and paroxysmal hæmoglobinuria, though the evidence of this association is by no means strong.

Causation
and Morbid
Anatomy.

The urine in cases of this malady deposits, on standing, large quantities of dark red or brown thick material, which is nothing else than the remains of broken-up and disintegrated red blood corpuscles, and consists, therefore, chiefly of a mass of hæmoglobin. Interspersed in the mass

of tenacious material are often found shining crystals of hæmatin, and also tufts and plates of hæmatoidin.

It is scarcely necessary to remark that the urine is loaded with albumen. By the guaiacum test the presence of blood may be easily detected, and if examined spectroscopically, the bands characteristic of oxy-hæmoglobin will be prominently visible.

The explanation of the great destruction of red blood corpuscles to which the very curious appearances in the urine are due is admittedly obscure. It is well known that the administration of certain drugs, of which chlorate of potash is a conspicuous example, may be followed by disastrous results which are due to acute blood disintegration; and we are justified by analogy in assuming that a similar or allied cause, the nature of which is, however, quite unknown, may in the same way excite those destructive changes which give rise to the phenomena of paroxysmal hæmoglobinuria.

It is still undetermined whether the disintegration of the blood takes place in the kidney, the lesion being exclusively renal; or whether, on the other hand, the kidney is merely a filter by which the removal of the previously broken-up red corpuscles is effected.

It must be admitted that, at the present time, it is utterly impossible to give a satisfactory, or even a reasonable, explanation of the features presented by this malady.

Treatment.

From the point of view of drug treatment there is absolutely nothing to be said concerning this affection. No drug whatever has the slightest influence in controlling the symptoms.

The patient should be kept in bed after a warm bath, and, if necessary, use must be made of hot-water bottles. By avoiding all exposure to chill, it is conceivable that attacks may be warded off.

DISPLACEMENT OF THE KIDNEY— FLOATING KIDNEY

THIS condition is by no means an uncommon one, and is not seldom discovered accidentally during an examination of the abdomen, undertaken probably for reasons wholly unconnected with the supposition of the presence of the floating kidney.

Floating kidney is far more often met with in women than in men, and there appears to be a marked tendency for the right rather than the left kidney to be the subject of the abnormality of position.

The lesion consists in an undue mobility on the part of the kidney, by which its displacement laterally, but chiefly downwards, is permitted. And it is sometimes noticed that this movable condition is not confined to the renal organ, for it may be that along with the affection of the kidney there is also present a general tendency to prolapse on the part of the pelvic and abdominal viscera.

In many cases of this abnormality there are no *symptoms* whatever, the patient making no complaint until, perhaps, she has been informed of the displacement of the kidney. On the other hand, very severe and definite symptoms may spontaneously arise.

In many instances a large number of highly indefinite pains and aches referred to the chest, back, and abdomen accompany the malady; flatulence, palpitation, constipation, throbbing and hysterical symptoms generally, may all be associated with the presence of floating kidney, and in some cases the clinical picture of neurasthenia may be vividly depicted. These are, of course, the indefinite symptoms of floating kidney, which may, in reality, be but little dependent upon the presence of the abnormality itself

Symptoms.

being rather a manifestation of that neurotic tendency which so often co-exists with the renal lesion.

There are, however, other and very definite symptoms to which floating kidney may give rise; thus, real and indeed very severe pain may be caused by twisting of the pedicle, and a kink of the ureter thus induced may lead to hydronephrosis. Again, the displaced organ may press on the gall-bladder or on the transverse fissure of the liver, and may thus induce jaundice. Very rarely floating kidney has given rise to hæmaturia, probably due to twisting of the ureter and hindrance to the return of the blood from the kidney.

It is important to remember that, in rare cases, symptoms of localised peritonitis have arisen in connection with the presence of movable kidney. When these symptoms occur it is in all probability as the result of twisting of the pedicle, to which allusion has already been made, and which may possibly be excited in some cases by physical over-exertion.

In the great majority of cases the floating kidney does not manifest itself by any very definite symptoms, at the most in our experience there is some complaint of dragging or bearing-down pain combined with an emotional tendency. The fact that in many cases the discovery of the abnormality gives rise to symptoms, none of which were complained of previously, is strong proof that the actual symptoms of the displacement are practically very often *nil*.

Only in a minority of the cases are the severe symptoms, already fully described, present; but these may be so urgent as to render the patient's condition a very miserable one.

In examining for floating kidney, the patient should be placed on the back, and the attention distracted by conversation in order to produce laxity of the abdominal walls, which may perhaps be also attained by drawing up of the legs. The examination must be made bi-manually, and

care must be taken not to confound a wandering spleen with a floating kidney. The notch or notches in the margin of the former will prevent its being mistaken for the latter.

The surface of the floating kidney is notably smooth, and the form of the organ is easily recognisable. But the presence of hydronephrosis, or of tumour, may lead to great increase in the size of the kidney, or the enlargement may be brought about by the presence of cystic disease.

In most cases the patient winces when the movable kidney is pressed between the hands; indeed, sometimes the tenderness is extreme, so that the least pressure is painful. We have met with cases in which pressure on the floating kidney leads immediately to retching, and sometimes actual vomiting may be thus induced.

In treating cases of movable kidney, the first matter of Treatment. importance is to endeavour to anchor, as it were, the floating organ. It is, however, often very difficult to effect this object, so easily does the movable kidney escape from the restraint of pads and bandages. Should acute symptoms arise, the use of warm baths or warm fomentations to the surface of the abdomen may be effectual.

In most cases support to the kidney is all that is required; but, fortunately very rarely, patients are met with whose lives are more or less embittered by the presence of this renal abnormality. Under such circumstances, and also when the floating kidney has become the seat of malignant or other growth, it may be necessary to remove it. Unless the remaining kidney is sound, it is clear that such an operation is unjustifiable.

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